

BROOKLYN BOTANIC GARDEN

PLANTS
&
GARDENS

PLANTS & GARDENS

SUMMER FLOWERS FOR CONTINUING BLOOM

Annuals,
Perennials,
Shrubs and
Trees

Climbers
and
Trailers

Plants in
Containers

Popular Favorites
and Rarities

Veggie
Gardening

Summer Flower
Arrangements

SPRING
1988

1988 GUIDE



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(Concluded on page 89—inside back cover)

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Summer Flowers for Continuing Bloom

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For a list of topics see back cover.



Herman v. Wall

'Golden Splendor' lilies, lupines and phlox grow well together.

BROOKLYN BOTANIC GARDEN

One of the most frequent single questions asked of Botanic Garden Staff Members is . . . "What can I plant that will bloom all summer?" We gave the challenge to Guest Editors Arno and Irene Nehrling and, with the informed and talented team they invited to contribute to this Handbook, the question has been well answered for gardeners in almost every climate. Wherever bloom times are specifically referred to they apply to the authors' own geographic areas.

The coverage in this Handbook will be helpful to the horticulturally informed as well as to those who have yet to plant their first seed. All the summer flowers are here—from the common to the unusual, from the easy-to-grow to the not-so-easy and from the somewhat shy bloomers to those that can be counted on for a parade of color. There is also splendid guidance for those who seek out-of-the-usual foliage character (page 48).

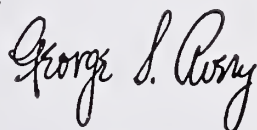
To mention a few articles for particular attention: Heaths and heathers offer almost endless variations in character of plant as well as flowers (page 54). The heathers are of special botanical interest because they are all one species, like the common dog—and the great range of kinds are only cultivated varieties, or "cultivars." The word "cultivar," incidentally, is worth getting used to, and using, and plant names having this status (plain or fancy) appear throughout this Handbook in single quotation marks.

Tuberous begonias are apt to have nostalgic appeal for those who have traveled in Belgium and seen the endless fields (nurseries) of tuberous begonias in bloom. They are surprisingly versatile plants. Don't overlook them as most gardeners do (page 57). And don't overlook the general problem of color in the summer garden (page 60).

Summer-flowering trees and shrubs make a contribution to any home landscape (page 62). Here at the Botanic Garden the outstanding summer-flowering tree (two months of bloom) is the hardy silk-tree, generally and mistakenly called "mimosa tree." As to growth habit—it has no special virtues. It is two to three weeks later than most trees in leafing-out in the spring, but once green, its foliage is pleasantly tropical in feeling and "goes to sleep" at night. New blossoms come into flower each day, so there is a constant renewal of the delicate pink powder-puff-like blossoms. Those who grow it at the northern limits of its range (Zone 5) may see a curious winter-killing of the cambium around junctions of larger branches, *i.e.*, scars that do not heal; but this failure to be fully winter hardy does not affect its blossom performance. The hardy silk-tree is not alone in its extended summer perfection—see the surprisingly long list of other woody species that can be grown rewardingly (page 62).

There is merit in having small movable garden units that can be shifted here and there according to need. Gardening in containers (page 70) is one answer, and hanging containers (page 81) are particularly versatile—they can hang in trees, on verandas or from brackets on stark walls. Climbing plants lend themselves to many uses, too (page 74).

This is definitely a STOP-LOOK-AND-SEE Handbook, and every article deserves a careful screening by those in search of ideas as well as information. Study it now in the light of current summer gardening efforts, then put it to work for next year's garden. And don't overlook the importance of design and background. They can make or break a garden—regardless of continuous bloom.



Director

MY GARDEN IN SUMMER

Richard C. Hands



Taloumis

Sweet-alyssum, backed by pansies, effectively edges a colorful flower border.

GARDENERS have widely differing ideas about what plants are best suited to their home landscapes, but continuous bloom is a goal toward which most of us strive. For me, this happy condition has occurred more or less by chance, so it may be of some value to others to hear about some of the most satisfactory plants in my old garden.

One of the most common questions asked by beginning gardeners is, "What blooms all summer and comes up every year?" Unfortunately, the number of plants in this select category is small, and if a gardener wants flowers all summer, he had best concentrate on growing annuals. However, if he wishes more permanent plants he should select herbaceous perennials or woody plants, realizing that their flowering periods are generally

briefier than those of annuals, but that a well planned selection can be made to bloom in long-continued succession. Many of the best perennials, for instance, flower during May and June, before the buds of even the earliest-flowering, self-sown annuals begin to open. Woody plants are widely varied in their periods of bloom.

Annuals

Most of the annuals I grow are raised in rows in the vegetable garden. There is no space for many of them in the perennial gardens which border the stone walls that are a conspicuous feature here, as in so many New England yards. Small beds close to the house are filled in spring with the bright color of bulbs. Later, they hold a few annuals such as sweet-alyssum and petunias, as well as love-in-a-mist (*Nigel-*

la damascena) with its attractive pale blue flowers set in a green ruff, and tall white and pink nicotiana. These last two self-sow freely, as do gloriosa daisies and calendulas in the part of the vegetable garden reserved for cut flowers.

There, several annuals are sown where they are to mature. Zinnias, nasturtiums, marigolds and cockscomb are some of the kinds which come along so rapidly when sown in the open during late May or early June that it is unnecessary to start them indoors.

However, other annuals are sown during March and April in shallow seed boxes, being grown slowly in coldframes and transplanted into rows in the cutting garden as soon as the weather moderates, usually during early May. Asters, the wonderfully fragrant Chabaud carnations, stock (with its oddly cabbagey scent) and the ubiquitous petunia are grown this way. So, too, are sweet peas started indoors, being transplanted once with both their tops and roots pinched, and being lined out under supports in well-prepared trenches as soon as the soil is workable. This early start produces a

greater supply of blooms than would more casual growing methods.

In addition to these basic bedding and cutting plants, a few less common annuals are tried each year, almost always being started indoors their first year, to determine how difficult they are. Many are merely curious plants not worth recommending, but others are as good as any annual commonly raised. Pale-blue *Orypetalum caeruleum* is a long-flowering relative of our milkweeds that makes a splendid bedding or pot plant. Bright yellow *Xanthisma texanum* flowers all summer in the driest location. Scarlet *Emilia sagittata* and such African daisies as white, blue-centered *Arctotis stoechadifolia* and orange *Dimorphothecca sinuata* are worthy of wider use.

Perennials

Many of the perennials which provide the most summer color in my garden are so well known as to require little comment. Hybrid daylilies lend every shade of yellow, orange and red to the July garden, while the anciently-grown lemon-lily, a dwarf yellow daylily, provides a

This border with a hedge as a backdrop includes such perennials and annuals as globe-thistle, veronica, campanula, chrysanthemums, columbine, evening-primrose, phlox, dusty-miller and pansies.

Talounis





Taloumis

The airiness of baby's-breath adds a light touch to the summer garden.

show in spring. Some of the daylilies are still blooming during the first weeks of August, and varieties could be selected to extend the season still longer.

Another pair of well-known perennials, coral-bells (*Heuchera sanguinea*) and baby's-breath (*Gypsophila paniculata*) add light touches to the July garden, while the less familiar, late-flowering baby's-breath (*G. oldhamiana*) is attractive in late August and September.

Various blue and purple salvias are useful garden plants, the best of the truly perennial kinds being *Salvia superba*, which flowers through July and into August, producing a great many dark purple spikes which are always made more attractive by a group of yellow and black bees.

At about the same time, butterfly-weed (*Asclepias tuberosa*) is at its peak, adding its brilliant orange flowers to the hot, dry dooryard garden. This excellent wild flower has begun to sow itself freely, and in time a good colony of it will be established.

In addition to the familiar trio of phlox, fall asters and chrysanthemums, long periods of color are added to the perennial garden by July-blooming, pale yellow *Achillea taygetea* (regrettably a rather fast spreader, like many in the genus); lavender-blue balloon flower (*Platycodon grandiflorum*); and the incredibly long-blooming, deep blue plumbago (*Ceratostigma plumbaginoides*),

which forms a colorful carpet through the late summer and early fall.

Shrubs

Among shrubs which are most satisfactory for summer effect, potentilla 'Katherine Dyke' is especially notable. Although the most important display of this small shrub's dime-sized yellow flowers is in June, some blossoms are produced intermittently throughout the summer. Like the spireas and a few other shrubs, this potentilla can be divided as easily as a perennial.

Two attractive shrubs which bloom during late summer are lavender-blue chaste-tree (*Vitex agnus-castus*), whose fragrant hand-like leaves are an appealing feature even when the shrub is not in flower; and its companion in the vervain family, bluebeard (*Caryopteris incana*). Although both bloom for a long time, they are surpassed in this regard by the butterfly-bush (*Buddleia davidii*), rather tall and rangy, to be sure, but worth having for its purple, maroon, pink or white flower spikes, and for the butterflies it always attracts. These three shrubs are not the hardiest garden plants. In fact, buddleia is usually treated in this area (Massachusetts) as a die-back shrub, being cut to the ground each spring and permitted to reach its max-

Asters will bloom early when sown in coldframes in March or April.

Taloumis



imum summer height without further attention. I must confess that all three have proven to be permanent die-back shrubs in my garden, and never recovered from one of those bitter winters for which New England is famous. However, they are inexpensive and will be replaced. Because there are so few useful summer-blooming shrubs, these three ought to be recommended, despite their borderline hardiness.

Geraniums and Roses

Two beds close to the back door provide color throughout the summer: a rectangular garden of geraniums where numerous shades of pink and red fight in defiance of all principles of civilized taste; and a square rose bed bordered with that immaculate edging plant of ancient heritage, germander (*Teucrium chamaedrys*). The rose bed is maintained with cheerful disregard for most of the requirements stated in didactic and threatening reference books; a policy which is not disastrous only because the rich and heavy soil in that section of the yard is quite perfect for roses.

Floribunda roses must take the prize for being the best producers of summer bloom, and of them more than any plants it might be said that they bloom all summer and come up every year; they are freer with their flowers than hybrid tea roses and usually hardier. A personal favorite is cherry-coral 'Vogue', but there are many other good varieties, all of which look best when grouped in blocks of three

Nasturtiums grow so rapidly and flower so reliably that they may safely be sown outdoors in late May or June.

Taloumis



Taloumis

The sweet-pepper bush is a native shrub which adapts itself readily to the shady garden.

or more plants of one variety. There is also a large class of repeat-blooming shrub roses which is coming into favor. One that has done well in my garden is the hybrid musk 'Belinda', which bears large clusters of single pink flowers in July, as well as occasional later blooms. Despite its classification, which holds promise of a musky fragrance, 'Belinda' is practically scentless.

Wild Plants

Native shrubs which appear where the garden meets the woods are welcome bonds with the wildness which springs back in odd corners throughout suburbia. One of the best of these shrubs, which remains in flower for at least two weeks, is the white sweet-pepper bush (*Clethra alnifolia*), which has come up in a moist corner. Arrow-wood (*Viburnum dentatum*) and elderberry (*Sambucus canadensis*) are earlier white-flowered shrubs, but clethra is better and especially appreciated for its fragrance. As it reaches its peak other native plants bloom in the fields and hedgerow: Joe-Pye-weed and early goldenrod, wild primroses and jewelweed. Here and there fat torches of sumac appear to lead the way from summer into fall. ♦



MARIGOLDS, ZINNIAS AND PETUNIAS

Star performers of the summer garden

Jean Hersey

WHEN spring comes we all go slightly mad as the garden centers, supermarkets and hardware stores sprout flats of promising seedlings, balled shrubs, racks of gay seed packages, shiny new trowels, and great coils of bright green hose.

How can you resist? Don't even try, but let yourself completely succumb to your springtime fancy as the best season of the year commences!

Among the varieties of small plants to which you always yield will surely be a good choice of star performers, marigolds, zinnias and petunias. With plenty of these three marvelous annuals you have bloom for indoor bouquets, for winning flower contests, and for just appreciation while they grow, for they bring you a garden of special beauty in their shapes, textures and vivid colors.

An advantage of setting out young plant of these, instead of waiting to sow seed outdoors, is that you have a flowering garden much sooner. And as you usually find an opening bud here and there you can plan your color arrangement accordingly. However, these three annuals also grow readily from seed. Sow in fertile pots or little peatmoss boxes in the ground in May. The only difference is that they will flower somewhat later.

Marigolds, zinnias and petunias adapt themselves to a variety of soils. I have seen them flourishing in the red clay earth of North Carolina, under the streaming California sun in an assortment of different kinds of earth, and in the sandy seashore gardens of Cape Cod. Here among ocean fogs and in salty air the colors are incredibly vivid.

You can also find them flourishing widely in Europe—England, Holland, Germany, France and many other countries. In remote mountain village window boxes in Switzerland you can scarcely find the petunia plants, so thoroughly do the blossoms hide them. Marigolds in Swiss dooryard gardens are large and lush. The colors of all three annuals are extremely bright in the Alps. There is perhaps something special about the Swiss mountain air.

But in Connecticut, though lacking mountain atmosphere, special sea air and the California kind of sunshine, we do very well with them all, and the foliage of these three annuals is so appealing that we are glad we can easily locate it between the blossoms.

Marigolds

The name marigold is said to be derived from "Mary's gold," and pure gold the blossoms are, too. The way they appear to catch the summer sunshine is exciting; you can even see it glow in their blooms on rainy days.

Marigolds come tiny or tall, from a mere few inches to 4 feet with huge flowers. They grow single and double and in a wide range of lemon yellows and rich golden oranges. Some are delightfully touched with mahogany. The rays can be crinkled and curled, or smooth and velvety, the blossoms full and fat or small and slim. Marigold foliage has a fern-like quality, pleasant to touch and handle. And I happen to like the fresh pungent scent that remains on my hands a while as I work about the garden.

Zinnias

Zinnias draw their tints and shades from all the best winter sunsets and the wildest summer ones. They come in every color but blue, and the great white ones are like velvet. The scarlet tones are so vivid your pulse quickens just to look. Some varieties have flat rays, some quilled, some twisted and twirled. They can be tiny, too, as small as your thumb nail, while certain of the giant types are nearly as large as your whole hand.

Twin zinnia leaves, as they first appear from spring-sown seeds, are a delight. Later, in their rich bright green, they make a beautiful background for the handome, aristocratic blossoms. When the seedlings reach a height of about 6 inches, harden your heart and cut off the tops even if buds seem imminent, in order to have fuller, bushier plants.

Our zinnias in Connecticut grow along the edge of the vegetable garden. Their brilliant colors make a gay and glowing frame for neat rows of lettuce, spinach, beans, and sweet corn. They are also excellent in a bed by themselves or mingled in with other annuals or perennials.

Zinnias and marigolds are both easy flowers to dry (petunias are difficult). Both will shrink a little in size but maintain their colors one winter, maybe longer.



Taloumis

Tumbling out of a barrel is one way to grow petunias.



Taloumis

Marigolds make vigorous growth for a border planting.

Petunias

Of what an entirely different character are petunias! These flowers, with their fragile corollas, are dainty. Some varieties have the sweet scent of a summer meadow in the sunlight. A great number of colors are represented in these lovely annuals, from deep, dark, velvety purple through blues, pinks and reds. Some kinds are two-toned, giving the effect of stars. And the whites at dusk or in the moonlight bring a touch of magic to the garden. Their apple-green foliage is soft, almost downy to touch, and most attractive to look at.

Petunias make fine border plants. When they have bloomed a while and tend to straggle, they can be trimmed back drastically. Soon the new growth will become compact and the plants will again be covered with new buds and flowers.

For all their delicacy, these flowers will continue blooming right on till frost, and even beyond a few light freezes.

Cultural Requirements

These three choice summer annuals—marigolds, zinnias and petunias—have certain needs in common. Requirement number one for them all is sun, and sun, and more sun. If yours is a shady garden, grow something like lady's-slippers and ferns, but don't attempt these annuals, for they would only disappoint. All

MARIGOLDS

Height	Class	Yellow	Gold	Orange
6-8 in.	Extra Dwarf Double	Petite Yellow	Petite Gold	Petite Orange
8-12 in.	Dwarf Double	Spun Yellow	Spun Gold	Sunkist
8-12 in.	F ₁ Dwf. Hybrid Triploid	Yellow Nugget	Gold Nugget	Orange Nugget
12-18 in.	Semi-Dwarf Single	Sunny	Naughty Marietta	
12-18 in.	Semi-Dwarf Double			Tangerine
18-24 in.	Semi-Tall Double	F ₁ First Lady	F ₁ Golden Jubilee	F ₁ Orange Jubilee
24-36 in.	Tall Double	F ₁ Doubloon	F ₁ Sovereign	F ₁ Toreador
24-36 in.	Tall Mum-Flowered	Mammoth Mum	Glitters	Goldsmith
36 in.	Double Fistulosa	Lemon All-Dbf.		Orange All-Dbf.
6-10 in.	Special Classes	Goldilocks (Lulu)		<i>T. signata pumila</i> 'Ursula'

three can take dry summers remarkably well, and will let you know by the look and feel of the foliage when it is time to water. Somewhat before they literally wilt the leaves will lose their firmness and

Marigold 'Golden Jubilee' deserves attention when vivid annuals are being sought for the garden.

All-America Selections



vitality. This you can detect by feeling them. We water in the late afternoon and very thoroughly, then skip a day or two and rewater, always abundantly.

All three are reasonably insect- and disease-resistant, especially if grown under conditions they like—good sun, fertile soil and adequate water. The healthier the plant of any variety, the less likely it is to succumb to ailments or bugs. For us they all flourish in rich sandy soil with lots of compost and some organic plant food from time to time.

A good way to keep these annuals thriving and hearty is to mulch. One fine day in mid-June after a rain, weed thoroughly, feed, cultivate, and then mulch. You can use grass clippings, cocoa hulls, buckwheat hulls, etc. This turns your flower bed completely carefree for the summer. The mulch also reduces but does not eliminate the need for watering. There is no further tending or coddling; from here on merely pick and enjoy.

In early fall just before frost these three annuals seem to produce their most brilliant colors. While nature on all sides flings her brightest palette over the landscape, these flowers match her mood. ♦

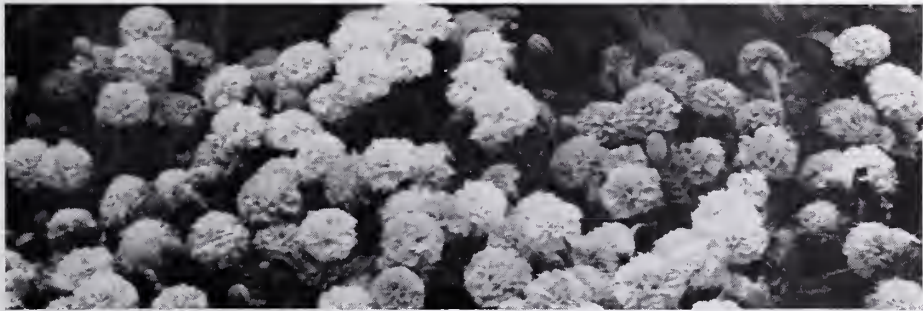
MARIGOLDS, *continued*

Primrose	Bicolor Mahogany
Pygmy Primrose	Petite Harmony
Eldorada	Sparky
	Red Head
	Rusty Red
Alaska	
F ₁ Primrose Climax	

Note: Most of the small-flowered marigolds (*Tagetes patula*) have been called the French type, single- and double-flowered and bicolors with reddish mahogany. The *Fistulosa* type has been called African, although marigolds are native only to the Americas. Now, all the large double-flowered (*Tagetes erecta*) are classed as American marigolds. Most are carnation- and chrysanthemum-flowered doubles; erect bushy habit from less than 1 to over 3 feet tall. *Tagetes filifolia* has a variety called 'Irish Lace' which is recognized as a separate foliage type.

Three dwarf marigolds—'Petite Gold', 'Petite Orange' and 'Petite Harmony' make a gay low border.

All-America Selections



ZINNIAS

Height	Class	Crimson	Scarlet Red
6 in.	Thumbelina, Mixed		
6 in.	Sanvitalia procumbens		
8-10 in.	Linearis, semi-dbl.		
12 in.	Button, Cupid, Tom Thumb		Red Buttons
18-24 in.	Lilliput, Pompon	Mahogany Gem	Scarlet Gem
15-24 in.	Haageana, Mexican		
24-30 in.	Pumila, Cut-and-Come-Again		Scarlet
24-30 in.	Giant Cactus-Flowered	Red Man	F ₁ Firecracker
2-3 ft.	Dahlia-Flowered	Crimson Monarch	Scarlet Flame
2-3 ft.	California Giant		Scarlet Queen
3 ft.	Giant Tetra State Fair	Dark Scarlet Shades	Light Scarlet Shades

ZINNIAS, *continued*

Yellow	Gold	Orange	Pink	Rose
Creeping Zinnia				
		Linearis		
			Pink Buttons	
Canary Gem		Valencia	Flesh Pink	Rosebud
Canary Yellow		Tangerine	Pinkie	Salmon-Rose
F ₁ Yellow Zenith	F ₁ Bonanza	Blaze	F ₁ Princess	F ₁ Wild Cherry
Canary Bird	Golden Dawn	Golden State	Luminosa	Exquisite
Daffodil	Isabellina	Orange Queen	Brightness	Enchantress
Yellow Shades	Golden Yellow Shades	Orange Shades	Pink Shades	Rose and →



All-America Selections

Zinnias come in many sizes, styles and colors. Shown here, left to right, are 'Old Mexico', a Haageana type; 'Firecracker', an F₁ giant cactus-flowered hybrid, and 'Thumbelina', the dwarfest, which is available in mixed colors.

ZINNIAS, continued

Salmon-Apricot	White	Purple	Lavender	Bicolor
	White Gem			
				Persian Carpet, Old Mexico
	Snowball			Peppermint Stick
	Eskimo		Lilac Time	
Eldorado	Polar Bear	Purple Prince	Dream	Envy (green)
Salmon Queen	Purity	Violet Queen	Lavender Queen	
Salmon Shades		Purple and →	Lavender Shades	

Note: There are other types of zinnias, as Crested or Gaillardia-flowered, Fantasy or smaller Cactus-flowered, Pinwheel bicolors and special novelties. Flower sizes are from 1½ inches on Thumbelina, Buttons and Cupids to 2 inches for Lilliputs and Mexi-

cans, 2½ inches for Pumilas, 3½ to 4½ inches for Cactus, 4 to 5 inches for Dahlia-flowered, 5 inches for Giant Cactus-flowered and California Giants, 5 to 6 inches for the State Fair or Giant Tétrazinnias.

PETUNIAS

Height	Class	Crimson	Red	Rose	Salmon
8 in.	Dwf. Giants of Calif.			Rose	
8 in.	F ₁ Dwf. Gts. of Calif.			Rose	
12 in.	<i>P. hybrida nana compacta</i>	Velvet Ball	Fire Chief	Celestial Rose	
12 in.	F ₁ Hybrid Multiflora	Purple Plum	Comanche	Cherokee	Coral Satin
12 in.	Grandiflora	Burgundy		Theodosia	
12 in.	F ₁ Hybrid Grandiflora	Matador	Red Cascade	Prima Donna	Ballerina
12 in.	F ₁ Dbl. Multiflora		Cardinal	American Imp.	Honey Bunch
12 in.	F ₁ Dbl. Grandiflora	Rhapsody	Valentine	Caprice	Allegro
18 in.	Hybrida	Gen. Dodds		Radiance	
18 in.	Balcony	Crimson		Rose	
18 in.	Tall Giants of Calif.				

PETUNIAS, continued

Pink	White	Violet-Purple	Blue	Red-Rose Bicol
		Orchid		Rose-White
		Orchid		Rose-White
	Snowball	Blue Bedder	Silver Blue	
Pink Satin	Paleface	Blue Ribbon	Mercury	Meteor
	Snowstorm Imp.	Dwf. Elk's Pride		
Appleblossom	White Cascade	Blue Jeans	Sky Magic	Calypso
Pink Riches	Snowbird	Plum Double		Strawberry Tart
Canadian Queen	Sonata	Nocturne	Blue Bonnet	Presto
	White King	Violacea		
	White	Blue		



Taloumis

Petunias planted in clumps around a formal pool soften the stark lines of the cement rim and give a colorful effect all summer.

Violet-Purple Bicolor	Other
	Copper
	Copper
Elk's Star	Martha Washington (Lav. blue veined)
Polaris	Moon Glow (cream yellow)
Fandango	Sunburst (cream yellow)
Polka Dot	
Purple-White	
Howard's Star Imp.	
	F ₁ Frolic Mixed

Note: There are other sub-classes, as Plain and Fringed-Petaled, Hybrida Nana Compacta or Multiflora (small to medium-sized flowers) and Grandiflora (large flowers). Giants of California Superbissima classes are the largest-flowered of all, used mostly as pot plants. The Dwarf, 10 to 15 inches, compact growing, is the most useful and popular for garden use. Varieties named herewith are representative of main colors of their classes.



Park Seed Company

'Mini-Pink' is the name of this Thumbelina zinnia, which is less than 6 inches high. Members of this group are proving themselves ideal as front-of-the-border plants.

A LOOK AT SOME OF THE LESSER-KNOWN ANNUALS

G. M. Fosler

MOST of the annuals (and other plants sometimes treated as annuals) discussed below do well over much of the country, particularly if their individual needs are taken into account and a little extra care is given to soil preparation, watering, mulching, etc. All have been grown with good success at the University of Illinois Trial Gardens at Urbana for a number of seasons, and many have attracted considerable interest from visitors.

Admittedly, a search through various catalogs may be required to find seed of some of the minor annuals mentioned. But the time and effort involved will be worth while, for the unusual things you find will help to make you an out-of-the-ordinary gardener. Culture of the majority of them is comparatively easy, and starting them from seed should give no more trouble than many of the better-known garden annuals.

Brilliance in Yellow

For a bright touch of clear yellow in the home grounds, the heat-loving Mexican tulip-poppy or golden-cup (*Hunnemannia fumariaefolia*) is a winner. Variety 'Sunlight' (12-18 inches), in addition to a profusion of bloom from midsummer until frost, has attractive deeply cut gray-green foliage. The seedlings of this member of the poppy family do not transplant well. Therefore, seed for early-started plants should be sown directly into peat or clay pots filled with well-prepared soil. The young plants, with their undisturbed soil balls, are then set into the garden when the ground is warm in spring.

Heliopsis scabra zinniaeflora 'Summer Sun' is really a hardy perennial that makes a fine show the first year from seed and thrives in summer heat. Its golden-

yellow single and semi-double daisy-like flowers provide a bold splash of garden color over a long season. The sturdy, medium-height plants, while somewhat reminiscent of several roadside wild-flowers, are worthy of your attention because of the continuing profusion of blooms they will provide at the back of your border or in the wild garden. They are also good for cutting.

A Touch of Blue

Often admired in our plantings is *Oxyptalum caeruleum*, sometimes called southern star. It is currently listed in very few catalogs. The informal, low-growing plants bear silvery-green leaves and striking light-blue, star-shaped flowers. Typical of the milkweed family, the blossoms are followed by rather interesting elongated, green, milkweed-like seed pods. Plants can be started early indoors or in the greenhouse, or the seed can be sown directly outdoors when the weather has moderated.

A real trouper in full sun, regardless of the season, is *Nierembergia caerulea*, the dwarf cupflower. Variety 'Purple Robe' is the favorite. But also consider giving the taller-growing but little-known *N. frutescens* a trial.

For Groundcover and Bedding

Most gardeners would agree that good annual groundcover plants are rare. *Polygonum capitatum*, sometimes known as magic-carpet, summer-carpet or princes'-feather, is a thoroughly reliable one. In addition, it is useful in hanging baskets, window-boxes, and in the rock garden—either in full sun or partial shade. It grows only 4 inches in height, and produces a dense neat mat of attractively marked bronzy-red foliage, sprinkled with



Taloumis

A sturdy, drought-resistant plant with vivid orange flowers is the seldom seen species *Zinnia linearis*.

light pink globular flower heads held just above the leafy carpet. Always a strong grower, it often spreads to 3 or 4 feet by fall. Yet, in our experience, it is not weedy like many of its close relatives.

Among our most popular spring bedding plants are the various forms of the garden verbena, *V. hortensis*. But virtually unknown to a majority of gardeners are several worth-while species whose performance can command more attention than a passing glance. Ones we have grown and liked include *V. bipinnatifida*, the fern verbena (15-18 inches); *V. bonariensis* (3-4 feet); *V. rigida* (often offered as *V. venosa*, 12-20 inches); and *V. tenuisecta*, the moss verbena (fre-

quently listed as *V. erinoides*, 12 inches). These are best handled as annuals in colder areas. Their colors are predominantly shades of lilac or rosy-lavender.

Talinum paniculatum, sometimes called jewels-of-Opar, is something different yet useful that many people would surely enjoy having in their gardens. While not flashy and bold, it does produce neat, desirable, medium-height, rounded mounds of glossy deep green foliage. And above the leaves are loose, airy panicles of small light pink flowers. These are followed by tiny reddish-orange berries which also are attractive.

Zinnia and Daisy Kin

Two close relatives of the familiar garden zinnias are *Sanvitalia procumbens*, the so-called creeping zinnia, and another species, *Zinnia linearis*. Creeping zinnia is always compact, neat, bright and perpetually in bloom. The uniform low mounds of unobtrusive foliage are literally covered with small semi-double yellow flowers with striking black centers. *Z. linearis* is drought-resistant and reliable. Each plant bears a myriad of small semi-double orange flowers that have good carrying power. Fortunately, both forms are relatively immune to mildew.

Three seldom-grown daisies that can be recommended are: *Thymophylla tenuiloba*, the Dahlborg daisy or "golden fleece"; *Machaeranthera tanacetifolia*, the Tahoka daisy; and *Dimorphotheca aurea-tiaca*, the African daisy or Cape-marigold. The petite Dahlborg daisy is always bright, refined and perpetually covered with small yellow flowers over its lacy foliage. It is excellent for edging, for accent points or for the rock garden. The somewhat taller Tahoka daisy has larger flowers which are a shade of light lilac-blue with yellow centers. More striking are the blooms of the African daisy; these are single, reaching several inches in diameter. Available colors, usually with dark centers, include orange, yellow, cream, buff-apricot, and glistening white. Most varieties tend to be low-growing and somewhat spreading. These three forms of daisies need full sun.

In our experience, *Gazania splendens grandiflora* (usually offered in color mixtures) is rather a shy bloomer in mid-western summers. Yet flashy is the word for the bright-colored daisy-like flowers this little-known annual produces—borne on leafless stems above low crowns of thrifty foliage. Individual flowers are several inches across, and their colors include attractive shades of yellow, orange, reddish-bronze, salmon, pink, creamy white, and various zoned patterns. *Gazania* is worth a try!

Three Well-tested Novelties

Always good in our trials at the University is the Siberian wallflower (*Cheiranthus allionii* or, more properly, *Erysimum asperum*), really a perennial that can be handled as an annual if sown early. Its bright golden-orange flower



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Angel's-trumpet is a large and showy annual. It is well worth trying where there is ample space.



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Browallia grows and flowers abundantly in light shade, either on the ground or in a hanging basket, as shown here.

trusses held above neat, bushy mounds of foliage make it a much noticed and worthwhile garden subject.

The dwarf bush morning-glory (*Convolvulus tricolor* or *C. minor*) is quite unusual. Its miniature flowers which, in form, resemble those of the tall climbing morning-glories, are concentrically ringed in tones of blue, pink, crimson, purple and white. This novelty annual is good for edging as well as containers and low trellises.

For ground or basket culture in light to moderate shade, gardeners will be delighted with the performance of *Browallia speciosa major*, particularly the large-flowered varieties, 'Blue Bells Improved' and 'Silver Bells'.

Other Annuals Worth Trying

The list of lesser known but worthy flowering annuals is a long one, especially when it includes perennial and biennial forms that can be used as annuals. Some others worth trying, as time and garden space allow, are listed here:

angel's-trumpet (*Datura* in several species and varieties)
 basket-flower (*Centaurea americana*)
 beardtongue, annual (*Penstemon gloxinoides*)
 Cape forget-me-not (*Anchusa capensis*)
 Chinese forget-me-not (*Cynoglossum amabile*)
 chrysanthemum, annual (*Chrysanthemum* in a number of species and varieties)
 cigar-flower (*Cuphea platycentra*) and variety 'Firefly'
 Egyptian star-cluster (*Pentas lanceolata*)
 flax, flowering (*Linum grandiflorum*)
 leadwort (*Plumbago capensis*)
 love-in-a-mist (*Nigella damascena*)
 Mexican fire-plant or annual poinsettia (*Euphorbia heterophylla*)
 nemesia, annual (*Nemesia strumosa*)
 sage, annual (*Salvia horminum*) varieties 'Blue Bird' and 'Pink Sundae'
 snow-on-the-mountain (*Euphorbia variegata*)
 star-of-Texas (*Xanthisma texanum*)

sweet-sultan (*Centaurea moschata*)
 tassel-flower (*Emilia sagittata* or *Cacalia coccinea*)
 toadflax or baby snapdragon (*Linaria maroccana*)
 viper's-bugloss (*Echium plantagineum*)

To Grow for Foliage Effects

Several excellent garden subjects prized for their first-year foliage effects from seed are:

crinkled-coleus (*Perilla frutescens*)
 dusty millers (*Centaurea gymnocarpa* and *C. candidissima*, also *Cineraria maritima* 'Diamond', 'Hoar Frost', 'Silver Dust', 'Silver Lace' and 'Silver Queen')
 grasses: fountain grass (*Pennisetum ruppelii*) and blue fescue (*Festuca ovina glauca*)
 Joseph's-coat (*Amaranthus tricolor splendens*) and other forms of amaranth
 lavender-cotton (*Santolina chamaecyparissus*)
 silver sage (*Salvia argentea*) ♦



Taloumis

The daisy-like flowers of several annual species and varieties of chrysanthemum contribute brilliant colors to the garden. 'Golden Clarion' is shown here.

ADVENTURES WITH SNAPDRAGONS

Esther G. Rockwell

GARDEN snapdragons, actually rather tender perennials, are usually grown in the North as long-season annuals. Planted in sheltered positions, however, plants may survive even severe winters to give early and generous second-year bloom. We ourselves have a row of brilliant 'Volcanos' which, on Cape Cod, have survived frost, snow and alternate freezing and thawing through two winters and so far provided a third season of handsome bloom, the plants ever-increasing in size and beauty.

Grown simply as annuals, with no thought of their wintering through, garden snapdragons (*Antirrhinum majus*) are still among the most dependable and colorful of garden subjects, suitable both for display and for cutting. With the development of tetraploids and F_1 hybrids, snapdragons have taken on a new versatility which makes them equally at home in foreground, middle and back of border; and appropriate for either formal designs or casual mixed plantings.

My husband and I still remember the consuming interest among horticulturists and garden writers in 1946 when David Burpee of the W. Atlee Burpee Company called a meeting at Fordhook Farms in Doylestown, Pa., to reveal the story of the development of tetraploid annuals. On that summer day, more than two decades ago, a large group of writers and publicity people who could be counted on to spread the word from one corner of the country to the other, were introduced to the work of Dr. B. R. Nebel and his wife, Dr. Mabel R. Nebel of the Geneva Experiment Station in New York. These scientists, together with Dr. Albert F. Blakeslee of the Carnegie Institute, had discovered that colchicine (derived from the bulbs of the fall-blooming *Colchicum autumnale*), could be used to increase the chromosomes in plants, thus creating sturdier, more rugged varieties with



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Snapdragons, grown as garden annuals, are highly dependable plants, useful for cut flowers as well as for display.

stouter stems, heavier foliage and larger flowers than their normal diploid parents. Snapdragons were found to take to "tetraploidizing" like ducks to water, and on display that day were a number of examples. Today 'Giant Ruffled Tetra Snaps' are especially sought after as they produce larger, more ruffled flowers on spikes not quite so tall as on their long-stemmed parents, but huskier and handsomer. Between two and three feet in height, they are characterized by massive spikes in clear, brilliant colors, many also being available in separate hues, as named varieties. 'Orchid'—an orchid-purple with yellow blotch on lower lip—is most unusual, while orange and rose 'Volcano' is a real eye-stopper.

The terms F_1 and F_2 hybrids designate first and second generation filial hybrids from controlled crosses between carefully selected parents. Unlike older hybrids created more or less haphazardly from cross-pollination by bees in the field, F_1 's

give strains of superior size, color, form, disease-resistance and blooming time. Seeds from F_1 's produce, in the next generation, new groups quite unlike F_1 's, but equally or even more desirable. These are the F_2 's.

Examples of the F_2 or second filial generation hybrid snaps are the strains called Mardi, free flowering, and Master Blend, which is very early and boasts a full color range. Both are offered in mixtures only.

Two other snapdragons must be mentioned here though they are not tetraploids or F_1 hybrids. One is a real innovation with bell-shaped rather than dragon-mouth flowers. The strains are called 'Bellflower' snaps and 'Bright Butterflies'. Base-branching, $2\frac{1}{2}$ -foot plants bear spikes crowded with many bell-like blossoms in an unusually fine color range. They come into bloom early, too.

The other variety worthy of mention is little 6-inch 'Magic Carpet', which is almost creeping in habit. This colorful dwarf makes an ideal summer edging.



Taloumis

Snapdragons contribute an informal background for a border containing such flowering plants as annual phlox, feverfew (a perennial) and ageratum.

Both pure hues and bicolors in snapdragons are unusually brilliant; they lack only the true blues. The fact that one can order plants or packets of seed of specific colors, heights and earliness, means that the border may be planned in advance, enabling the gardener to grow plants to fill definite needs. Mixtures may be used to advantage in cutting gardens or in informal mixed borders where segregation of color is not needed or wanted.

For the amateur grower who wants a long season of snapdragon bloom, we suggest purchase of seed of the following strains and varieties, all of which may be sown indoors for earlier bloom if desired:

Low-growing

'Floral Carpet' for an early start and long-season, continuous bloom, on mound-like plants; perfect for front of border. All-American Bronze Medal winner.

'Magic Carpet' for summer and fall edging color.

Medium ($1\frac{1}{2}$ to 2 feet)

'United Sprites' mixture. Early flowering in fine pinks and reds; self-supporting.

'Carioea' strain. Available in 8 separate colors and bicolors.

Taller ($2\frac{1}{2}$ to 3 feet)

'Tinkerbell'. Bellflower type $2\frac{1}{2}$ feet tall, in pink. Continuous bloom from early midsummer into autumn. This new type provides a conversation piece.

'Sunrise' F_1 mixture. Extra early blooming, 2 to 3 weeks before most summer-flowering varieties.

'Master Blend'. Early flowering F_2 hybrids in mixture only.

'Rocket' F_1 hybrids. Sown indoors in January, seeds will provide plants for June flowering in the garden. Late blooming if sown outdoors. Sturdy; ideal for hot summer weather.

'Giant Ruffled Tetras' in separate colors for masses of bloom in the summer garden.

Very tall (3 feet)

'Sentinels'. Rust-resistant. Graceful, base-branching; spikes very tall, bearing up to 100 flowers each; for midsummer and early autumn.

'Supreme' F_1 's feature all-double flowers; heat-resistant for summer display.

'Vanguard' cerise-rose, All-America Bronze Medal winner. ♦

CONTINUING SUMMER BLOOM IN THE PERENNIAL BORDER

Elda Haring

OCCASIONALLY we see a perennial border that displays bloom throughout the summer season. The color masses and the patterns change, almost from week to week, but always there is a blend of flowing colors in adequate profusion to invite the eye to a closer, more appreciative inspection.

Such achievement in floral artistry does not come by chance. The designer is as much an artisan as the painter who creates an eye-pleasing landscape from the many colors on his palette.

To develop an everblooming garden of perennials requires considerable forethought. Such a border will have periods of magnificence resulting from the stately form or spectacular color of certain varieties; then there will be times when subdued tones and softer textures will pleasantly intermingle. But always there will be an abundance of plants in bloom.

A few hours of pre-planting study will pay handsome dividends. The most experienced landscape architect or knowledgeable gardener would not attempt to plant an everblooming perennial border without a definite plan to indicate the choice of plant material and the location of each variety. It is worth remembering that an eraser is an easier tool than a trowel to use for correcting an error in the placement of a plant.

How to Make a Plan

To prepare a garden plan, lay out on paper, to *scale*, the outlines of the border to be planted. Graph paper, marked off in squares (available in pads or sheets at most stationers'), is ideal for plan making, since each square can represent 4, 6 or 12 inches, or whatever one wishes.

Prepare a list of the perennials desired, bearing in mind their hardiness in your area. For each variety note the size

(height and form), period of bloom and color.

All borders have a front, even though located on the open lawn. Study your notes on the heights of various plants so that the tall ones can be selected for the background, the medium ones can be placed along mid-bed, and the low growers at the front. However, to prevent an appearance of regimentation, some of the tall and medium growers should be set a little out of line to intermingle and create billowing drifts. This scheme will relieve the monotony of an in-line planting. When similar plant material is used in moderate repetition through the border, the drifts of color tend to lead the eye pleasantly onward.

To keep the border colorful throughout the entire season, sequence of bloom of different plants must be kept in mind. The best effect is achieved when varieties which flower at the same time are separated by varieties that flower earlier or later.

While large plants like peonies, baptisia or loosestrife (*Lythrum*) may be planted singly, usually three plants of each variety should be placed together to make one large clump for a good display. These should be repeated at irregular intervals. A brilliant red, such as in the bee-balm (*Monarda didyma*) variety 'Cambridge Scarlet' or in Maltese cross (*Lychnis chalcedonica*), need not always be repeated but may be counted on for dramatic accent instead.

Silvery-leaved plants like artemisia and those with white flowers such as Shasta daisy, white veronica or white phlox need to be planted judiciously not only for the cool effect they give but to separate and prevent clashing of the sharper, bolder colors of other plants. The use of pale blues, such as in the flax species *Linum*



Walter Haring

Hemlock hedge and perennial border in the Harings' four-acre garden in Greenwich, Connecticut

perenne, relieves any possible monotony of the yellows, oranges and reds.

Iris, lilies and *hemerocallis* in early, mid-season and late varieties will provide bloom through the border for many weeks. Beginning in May you can have clumps of these in bloom as well as *Alyssum saxatile*, leopard's-bane (*Doronicum*), candytuft (*Iberis*), *Phlox divaricata*, *Nepeta*, *Primula*, *Polemonium* and pansy. In late May and early June the blooms of peony, astilbe, oriental poppy, alpine aster, *Linum perenne*, lupine, columbine (*Aquilegia*), *Oenothera fruticosa*, *Campanula persicifolia*, and pyrethrum and such biennials as *digitalis* and sweet-William set the stage for the spectacular of early summer.

For mid-June, there will be the daisy-like flowers of anthemis, tall delphinium, shrubby gas-plant (*Dictamnus*), sunflowers (*Helianthus*), mid-season daylilies and iris, false-indigo (*Baptisia*), coralbells (*Heuchera*), Siberian iris, gaillardia and *Salvia haematodes*. In late June and early July the Japanese iris terminate the season of iris bloom and the mid-season daylilies (*Hemerocallis*), like birds poised

in flight, continue to provide color throughout the border. As July advances, *gloriosa* daisy, Shasta daisy, yarrow, coreopsis, gaillardia, monarda, balloon-flower (*Platycodon*), early phlox, veronica, globe-thistle (*Echinops*) and stokesia assume their colorful obligations to maintain a continuing visual symphony.

In August and September the late phlox and various bulbous lilies take the stage. *Helenium* and *helianthus* with their warm fall colors will continue the bloom until frost. False-dragonhead (*Physostegia*) and mist-flower (*Eupatorium coelestinum*) liven up this display with their lavender blooms. The coneflowers (*Rudbeckia*) continue to flaunt their blooms while *Salvia azurea grandiflora* and hardy asters add blue to the fall scene. At this time the chrysanthemums will be on the threshold of their final burst of bloom at the season's end.

In the average perennial border there will always be voids left when the ripened foliage of early spring bulbs has been removed. Long-blooming annuals can be used to fill these gaps. Two excellent ones are the large-flowered marigolds and the



Walter Haring

INDIVIDUAL FLOWERS IN THE HARINGS' PERENNIAL BORDER

Upper left: columbine; upper right: lupine; lower left: gloriosa daisies and delphinium; lower right: *Centaurea macrocephala*, a relative of annual bachelor's-button

bedding dahlias, both of which will continue to bloom until frost.

If there is room, a 12-inch ribbon of bloom can be planted at the front, using annuals which will give a colorful fore-

ground to the border. Sweet-alyssum or dwarf ageratum can be used alone. However, for a border which has been planned for bold color, a mixed planting of dwarf ageratum alternated with dwarf marigolds is most effective. ♦



Taloumis

Above: Yucca in full flower is a striking foreground plant in natural rocky area. Below: Black snakeroot is the unseemly name for *Cimicifuga racemosa*, whose spires of small white flowers rise in the background of the border. Lilies, marigolds and masses of sea-holly (*Eryngium maritimum*) accompany it, with pansies across the front.





Taloumis

Above: Gladiolus makes a spectacular showing in the garden after the middle of summer. Below: Dahlias conclude the season with their bloom. Both gladiolus and dahlias must be lifted in the fall and stored over winter. The gladiolus can be propagated from the main corm and also from the corms that develop underneath it; the dahlia chiefly from the tuber at the point where the old stem was attached.





P. I. Merry

A planting in the Merry daylily garden in Needham, Massachusetts

HIGHLIGHTS AMONG THE HEMEROCALLIS

Ruth Peirce Merry

COLOR is what first attracts attention in the garden, and the perennial to provide color for the longest period is the daylily (*Hemerocallis*). From the 12,000 clones and more now registered with the American Hemerocallis Society there is a daylily to suit every taste and pocket-book.

Starting in early June their yellow flowers complement the violet tones of the bearded iris. With the last blooms of the iris, the daylily begins to take over the old "summer slump" and in late July dominates the perennial border. Bloom continues through August and in a lesser degree up to frost. This continuity of color is produced by the difference in blooming dates of the different clones and also by the floriferousness of the varieties. Although a single bloom lasts but a single day, a flowering scape will have from twenty to forty buds, which will open in succession over several weeks. Records show, for instance, that 'May Hall' (Hall) has had its first and last open flowers a month apart, and this is true of all modern varieties. Hybridizers do not

register clones with less than fifteen or twenty buds; in fact, they do not even keep them. Many varieties now have an extended blooming period; that is, the individual flowers will last until midnight, instead of closing at dark, and some will last overnight. Evening bloomers which begin to open in the late afternoon will remain fresh until the following day's blooms start.

There is a great variety in color, form and height. The color range is from very pale yellow, approaching but not reaching white with 'White Jade' (Fay), through all shades of yellow through deep gold to orange and brown; from palest pink approaching white in 'Pink Lace' (Kraus), through shades of rose, salmon and coral to red and maroon; and from pale lavender and violet to purple, verging on but not reaching blue in 'Blue Danube' (Lester). One of the bicolors with sepals of one color and petals of another can be seen in 'Arno Nehrling' (Merry); subtle blends occur in 'Veiled Beauty' (Hall), banded 'Lynn Hall' (Hall) and haloed 'Heart Throb' (Hall).



'Cartwheels'—a flattish flower with a 7-inch spread, golden in color



Merry

'Blushing Belle'—with recurved wide petals of rose-flushed peach

These novelties add even more interest to this plant group.

The size of the flowers varies from an inch across in 'Jenny Wren' (Fischer) to more than 7 inches in 'Paradise Beach' (Butterick), and the scapes—the daylily's flower stem is called a scape—may be anywhere from 12 inches to 5 feet high.

The six segments of the flower are divided into three sepals on the outside and three petals on the inside. These may assume a lily-like form as in 'Green Valley' (Fischer) or an amaryllis form with wide overlapping segments. In shape these may be either flat, as in 'Cartwheels' (Fay) or recurved as in 'Melon Balls' (Hall). They may have narrow twisted petals and be crinkled or waved. Spider types such as 'Kindly Light' (Bechtold) have very narrow petals; other types may be double, like 'Floral Pattern' (Fass), in which the stamens have turned into petals. The earliest double, 'Kwanso', in all its forms still fascinates those seeing it for the first time although it has been in gardens for many years.

Culture for daylilies is easy. Ordinary good gardening care will produce flowers, but a good all-around insecticide spray early in the season as a preventive measure, with a fertilizer having a low nitro-

gen content, and plenty of water at all times will encourage better growth and larger flowers. The plants will grow in full sun or semi-shade but not dense shade. Some of the pastels and reds prefer semi-shade.

Since the rose-colored form of the common orange daylily (*Hemerocallis fulva* var. *rosea*), source of most of the pink tones in the flowers, is a July bloomer, pink is not found in the earliest varieties. For this period 'Echo Valley' (Wild), a 5-inch fragrant clear lemon yellow growing about 5 feet high, is recommended. It blooms at the same time as the lemon-lily (*H. flava*). 'Primula' (Kraus), a taller-growing yellow, also opens at that time and will send up flower scapes intermittently all summer. 'Little Cherub' (Claar) an old favorite, has overlapping flowers of clear yellow. With its low height it is a good subject for the front of the border.

As the season advances the luscious melon tones, dainty pinks, delicate lavenders and gorgeous reds appear on the scene. 'George Cunningham' (Hall) is deep melon in color, a very sturdy grower with many buds and often with proliferations (plantlets) on the scape, which may be rooted in sand and eventually



'Arlow Stout'—a golden double daylily honoring an early hybridizer



'Felicity'—a lily type of daylily, showing the branching habit

grown into good plants. 'Fashion Model' (Lester) is a fairly new delectable light melon. In the real pink class 'Party Pink' (Childs), 'Pink Frost' (Claar) and 'Cara Mia' (Lester) are all charming. A newer variety, 'Puff' (Hall), is a dainty low-growing plant with truly light pink flowers that are most desirable. 'Lady Inara' (Hall), a small sweet pastel blend, and 'Luxury Lace' (Spaulding), a small pink verging on lavender, are both choice. For the lovers of red, 'Star Ruby' (Claar) is a stunning large ruby-red that blooms in early July. 'Summer Interlude' and 'Applause' (both Hall) are fine medium reds, while 'Ebony Prince' (Hensch), extremely dark, is exciting planted against pale pinks. With 'Blushing Belle' (Hall), a peach blend, the heavy texture of the petals causes it to remain open late in the evening, and it continues to flower until mid-August.

And all the time there are yellows and more yellows. The tall 'Finlandia' (Claar) has firm light yellow flowers with a crinkled edge. 'Cartwheels' (Fay), the stunning golden yellow variety with flat, broad, overlapping petals, was voted the Stout medal in 1966 as the best daylily of the year. 'Grand Champion' (Lester) is a large firm light yellow flower with green

heart. These three are just a taste of the many in the yellow class.

A variety that must have been named with tongue in cheek, since its first bloom is the last week of July, is 'Breath of Spring' (King) whose flowers continue for at least a month, depending on the size of the clumps and the number of scapes.

Late August brings the pale yellow 'Whistling Swan' (Hall) and also one slighter deeper in tone, 'Late Find' (Kraus), as well as 'Autumn Daffodil' (Kraus), with small flowers of daffodil-yellow, and 'Merrygold' (Merry), a gold variety with a maroon halo. 'Late Advancement' and 'Late Watcher' (both Hall) are new pink varieties that also continue into September.

Although with care transplanting may be done at any time, spring and fall—that is, before and after blooming—are preferable. For the winter, cut the foliage down to about a foot, remove the dead flowering scapes, and protect the plant site with a light covering of salt marsh hay, pine needles, or any customary airy material. Newly set plants need the covering the most. With this procedure there should be no loss during the cold months. ♦

More information on hemerocallis can be obtained from the American Hemerocallis Society. Annual dues are \$5.00, which should be sent to Mrs. Lewis B. Wheeler, Box 458, Crown Point, Indiana, 46307.



Taloumis

Phlox paniculata adorns the garden with continuous bloom from June to September.

THE LONG SEASON OF PHLOX

Roderick W. Cumming

PHLOX can delight the gardener with a selection from 50 different species, nearly all of them indigenous to the United States.* Among them are some fussy mountaineers, challenging little jewels for rock-garden fanciers; but here we shall speak mainly of the species that are most appropriate for summer flower beds. Inevitably there will be a few species of dubious appeal. However, at their most radiant, phlox seem to carol that "life is color and warmth and light."

We start with *P. amoena*, a tough little southerner insistent on dry, sunny spots. Only 12 inches high, it unsheaths many wiry, slender stems capped by attractive rose-pink cymes. Display is heaviest in late spring, but persists into early summer. Rich soils tend to degenerate the

thin-foliaged clumps, and they should be divided each third year in August or September.

Phlox nivalis and Offspring

The ubiquitous moss-pink (*P. subulata*) with its gay spring mats of color has a close relative, *P. nivalis*, the trailing phlox. The latter is looser, 9-12 inches tall, with spiny leaves, and often with showy flowers to 1½ inches across. Most important, the late spring floral showing is often repeated, even into autumn. But, since *P. nivalis* comes from sandy porous southern soils, only poorer ground assures heavy blossoming. Forms like 'Dixie Brilliant', the showy watermelon-red, can use light winter protection in the North.

Modern hybrids between *P. subulata*

*Since this discussion covers only summer flowers, we are not concerned with the joyous May-June deluge of bloom. Thus we omit such widely grown favorites as *Phlox subulata*, *P. divaricata*, and *P. stolonifera*.

and *P. nivalis* hold great promise of increased hardiness, larger flowers and lengthier displays. For example, 'Elaine Alexander' and 'Alexander's Surprise', both of superb pink clusters, often re-flower beyond September.

The Beauty of 'Miss Lingard'

Perhaps the taller, more stately phlox plants most impress us; at least they have become classical subjects for the garden. For instance, 'Miss Lingard', the lovely representative of *P. carolina* (*P. suffruticosa*), has long delighted lovers of perennials. About 3 feet tall, robust but lithe, it offers lush clumps of ovate glossy leaves and strong stems mottled reddish purple. Flowers congregate smoothly in large cylindrical panicles of purest white from late May until at least late July. 'Miss Lingard' is breathtaking in gardens near blue delphiniums, or as a gleaming nocturnal showpiece, as well as an excellent cut flower.

Properly grown clumps show little or no ravages of mildew, mites or other troubles, but neglected plants can suffer. They need a fertile soil or some organic matter, fertilizer (perhaps 5-10-10) in addition, and heavy watering in drought periods. Crowding within less than 2 feet of ground space per plant causes stagnant, disease-filled air, so plenty of room should be allowed. The cultivar can be increased by softwood cuttings in summer, and ought to be divided each fourth spring or fall.

Unhappily, the few colored variations, such as 'Rosalinde', appear to be merely dingy amaranth pinks. 'Miss Lingard' is sterile, does not often form seed, and has thwarted all efforts of breeders to introduce good color.

Dependable Summer Phlox

Definitely standbys of the summer perennial border are the gorgeous modern forms of *P. paniculata*, the summer phlox. While a widely settled native of the United States, this species has seen much improvement at the hands of Europeans.

Summer phlox are ever admired for their great rounded heads of flowers in

colors of nearly every hue (but no yellow!). Usually a faint, delightfully bucolic scent, as of new-mown hay, is apparent at twilight or in fresh early morning. Today's vastly superior offerings have clear, subtle shadings and prolific branchings. Heights range from 2 to 4 feet, and judicious selection allows display from late June until September. All, however, are unrewarding as cut flowers, for the individual blossoms drop from the cluster rapidly when in water.

Poorly grown summer phlox can be totally unsightly, so proper culture is imperative. Deeply rich soils of ample moisture are essential, as drought is a mortal enemy. Clumps should be spaced 2 feet apart for buoyant air circulation, and plants divided every three or four years in spring or fall. Individual flowers dwindle to dime size if division is neglected. Use only young outside growths, and reset these in newly enriched ground. Either sun or partial shade serve well.

Mistreated phlox plants are hideous caricatures, infested with mites, mildew, rust and other pests. An all-purpose spray or dust every three weeks is certainly time well spent.

As soon as an entire flower truss fades, one should snap it off just below the bottom flower. This encourages fresh new bloom from side shoots, and prevents seed formation. Volunteer phlox seedlings seem to favor ugly magenta tints.

Outstanding cultivars are countless. Whites include 'Snowball' and the taller 3-foot 'White Admiral'. 'Teeberg' adds a teasing red eye, while the name 'Blue Ice' is aptly descriptive of its subtle tones.

Pink is present in all its depths. The dwarf 'Pinafore Pink' and its offspring 'Fairest One', both under 2 feet, are delectably soft jewel-shell. Brighter pinks include 'Dresden China' and the whimsically named 'Dodo Hanbury Forbes'. Salmon tones abound, typified by the vigorous 'Queen of Tonga' and the lusty 'Sir John Falstaff'.

Red is also available in wide tonal variety. The tempestuous orange 'Orange' and the older 'Spitfire' are not as vivid as

(Concluded on page 38)

FAVORITE LILIES OLD AND NEW

Jan de Graaff



Herman v. Wall

Imperial hybrids are flat-faced lilies averaging 8 inches across and rather heavily perfumed. They occur in white, sometimes streaked or spotted, and in crimson and other colors. Plants may grow to a height of 6 feet.

EVER more varied—in color, form and season of flowering—the hardy garden lilies, mostly of hybrid origin, are presented to our American gardeners. The choice of what to grow, for cut flowers or for garden effect, for the border or the greenhouse, is becoming more difficult. Within the lily family the age of specialization is fast approaching. It is timely then to review our lilies, old and new, and to select a few particularly worthy of attention.

To begin with the old, there is nothing on the market today that approaches the serene beauty of the Madonna lily (*L. candidum*). When well-grown from clean, virus-free stock, this lily surpasses all others in beauty and scent. Combined with blue delphinium it creates a picture

ment. Unfortunately, virus-free stock is hardly obtainable so the gardener invites trouble if he introduces into his garden today either this lily or another old and usually virus-infected one, the ubiquitous tiger lily (*L. tigrinum*). Many older lilies, some still close to the wild species, suffer from the same debility. As a result we must look to the hybrids of recent origin to find healthy lilies for our gardens.

The choice has been made easier for us by a simple, easily interpreted classification. First-flowering and bright in coloring are the Asiatic lilies, derived from Chinese and Japanese species. This class includes the blazing orange-red 'Enchantment'; the softer-toned 'Harmony'; the gleam-yellow 'Destiny' and many others, all upright-flowering.

Then there are the outward-facing 'Corsage', 'Fireflame' and 'Paprika', the latter two both startling red. There is also the lemon-yellow 'Prosperity' and the soft orange 'Valencia'.

The third group, all with pendent flowers, includes the new pastel-tinted varieties derived from cherry-red Chinese and lilac Korean species. Here we find such delicate shell-pink and terracotta colors as in 'Sonata' and the lovely deep yellow of 'Amber Gold'. New varieties in this group, too numerous to mention here, are lilac-tinted and bronze as well as lemon-yellow, red and purple.

The next division includes all the hybrids of the European species *L. martagon*. Lovely for the woodland border, all these are, as well, real gems for the garden. They are, however, not to be used as cut flowers, since the scent is offensive. It is for this reason, too, that our rodents and deer leave them alone. Once settled in



Herman v. Wall

Harlequin hybrids, with spotted petals strongly recurved, come in many tones, ranging from purple and red to pale lilac, old rose, pink and even white, also from salmon and tangerine to yellow, with 30 or more flowers on a 5-foot stem.



Herman v. Wall

'Black Dragon' is a striking flower on a tall sturdy plant. The large white trumpets are of rich purplish brown outside.

and growing well, they remain for many years, to multiply and flower profusely on many tall stems. The colors range from the almost white 'Achievement' to the luminous bronze of 'Gay Lights'. There are now lilac and rose-tinted varieties and, thanks to several hybridizers, new additions to this group will soon be announced.

Following these hybrids of European ancestry, the American hybrids form Division IV. Here we have first the introductions from the West Coast, the hybrids between *L. pardalinum* and *L. humboldtii*. This division has been extended by the Bellingham Hybrids. Later additions are of *L. parryi*, which gave us the lily 'Buttercup', and of *L. kelloggii*, a group of pink, cerise and crimson hybrids, all with the typical orange blotch on the petals. A wide-open field for the amateur breeder can be found in these Americans. They cross, backwards and forwards, quite readily with one another. Already some hybrids between West and East Coast species have been announced. The time may not be far off when we may expect to see pink *L. superbum* and white *L. canadense* hybrids in our gardens.

The next division is that of the Aurelian hybrids. Based on the Chinese trumpet lilies—*L. regale*, *L. leucanthum* var. *centifolium*, *L. sargentiae* and *L. sulphureum* on the one hand and *L. henryi*, with its little recurved orange flowers, on the other, it has furnished us with a seemingly

inexhaustible variation of form, color, scent and season of flowering. The true trumpet lilies, which make up the largest number of hybrids in this division, are already well-known. I mention 'Golden Clarion', 'Pink Perfection', 'Green Dragon' and 'Black Dragon' as typical examples of the group. New colors are the two-toned pink and yellow of 'First Love'; the greenish white of 'Carrara' and the chartreuse of 'Honeydew'. In the same breath, I purposely mention some strains and named varieties. These fine trumpet lilies have been so carefully hybridized that new stock of identical form and coloring can be raised from seed. Thus the stock offered in the catalogs is constantly renewed and healthier and more vigorous than named varieties reproduced from scales or divisions.

The Aurelians come in trumpet shape, in bowl-shape, as pendent flowers and, finally, in Sunburst types. These last are a real addition to our gardens and make beautiful cut flowers. 'Bright Star' is a good example. It can be used as a corsage and looks lovely, too, in a large mixed bouquet.

Finally, we come to the glory of all "lilydom," the Oriental hybrids. You will

be the envy of your friends when they see these lilies with their 6-foot stalks bearing 8-inch flowers in your garden. Here nature has lavished all its affection and magic on a combination of two, three or four Japanese species. Beginning with the cross between the gold-band lily of Japan (*L. auratum*) and *L. speciosum*, often called the "showy lily of Japan," originally raised and shown by Francis Parkman just a hundred years ago, hybridizers have built on this foundation. Now any gardener can enjoy the beauty of 'Imperial Crimson', 'Imperial Silver', 'Imperial Gold'; and of 'Pink Glory', with a third species added, *L. japonicum*, from which it receives its delicate salmon-pink color. From purest white to salmon, shell-pink to golden pink and deepest crimson, in large flat flowers or in lovely bowl-shapes, these Orientals are the pride and glory of American garden achievement. They have been the cynosure of all eyes at the big European shows. They are finding their way into our gardens, our greenhouses and especially into our hearts. These are, indeed, the crowning glory of all that is new and good in the world of lilies. The peak of our achievement! ♦

Different types of lily bulbs, showing root production and the development of bulbils for propagation. The long underground stem belongs to *Lilium lankongense*, the leafy shoot of which may emerge 4 feet from where the original bulb was planted.

Herman v. Wall



LILY CULTURE IN TEN EASY LESSONS

1. Obtain, in fall if possible, plump, healthy bulbs of good varieties.

2. Plant the bulbs immediately in a well-drained site in full sun or part shade. If drainage is poor and cannot be improved easily, plant in raised beds. This is nature's way of growing lilies in swampy areas, the best bulbs being found on hummocks where they keep their feet dry. Except for *L. candidum*, plant bulbs in a hole or trench whose depth is three times the length of the bulb. *Candidum* lilies should never have more than one inch of soil over the top.

3. Protect the root-run from high soil temperatures with a light mulch or with low-growing companion plants.

4. In areas where heavy frost may be expected, planting near large trees or shrubs give some frost protection.

5. Lilies are heavy feeders, so fertilize just as you would for vegetables. A complete fertilizer, applied as soon as the plants emerge, is good. Better yet, apply phosphate at planting time, nitrogen during early stages of top growth, and sulphate of potash just before flowering.

6. Lilies are almost insect-proof and only a few species of aphids will sometimes attack them. In this case a standard rose spray can be used.

7. Remove old flowers as they become unattractive and do not allow seed pods to form. This will allow the plant to achieve the maximum bulb development and assure next year's flower crop. In cutting flowers for bouquets, do not remove more than one-third of the foliage.

8. In the fall, remove all old stems and foliage and destroy them.

9. Lilies like rather moist, but not soggy, conditions. Watering should be continued after flowering as long as the foliage remains green.

10. Lilies like to stay put. Do not transplant until they are getting crowded. When transplanting, dig, divide and replant at once. In cold areas late September or early October is the best time to dig lilies. In mild areas the transplanting season may be continued until sprouting occurs. *Candidum* lilies should only be transplanted during their summer dormant season.

If you like lilies, and wish to graduate from beginner to expert status, join the North American Lily Society, a nonprofit organization devoted to the advancement of lily culture. A membership is \$5.00 per year and may be obtained from the Executive Secretary, Fred M. Abbey, North Ferrisburg, Vermont, 05473.

—J. de G.

SUMMER ROSES

F. F. Rockwell

WE speak of June as the month of roses, but modern hybrids have now provided us with a host of so-called "ever-blooming" varieties which give blossoms each month during the growing season.

As a class the Floribundas produce bloom most plentifully from June to frost. Most of those recently introduced are a far cry from the old singles like 'Betty Prior' and her red brother 'Donald'. The former of these is so beautiful and so dependable that it is still a formidable rival to later introductions. The great clusters of single, carmine-pink flowers literally cover the rather tall plants, not only in June but during the summer and late into the fall. Introduced in this country by Jackson & Perkins in 1938, this variety is still one of the best for home landscape effects, and is often seen as well in mixed plantings around banks and public buildings where its gay informality takes the curse off even a foundation planting.

Today blood lines are so mixed that many Floribundas have flowers of Hybrid Tea form, though not so large. Vice versa, Hybrid Teas of recent introduction often are prone to produce Floribunda-like clusters of bloom rather than single, elegant buds, one each to a long, straight stem. The purist disbuds as soon as side buds form, thus assuring himself of flowers of show quality. Others prefer to permit the clusters to mature and so have more color but less perfect blossoms.

Given a healthy, very free-flowering variety of Floribunda, the gardener is quite sure to have profuse summer and autumn color in his rose garden. 'Sarabande', another single-flowered Floribunda of brilliant vermilion-red, is almost never without color. A friend of ours has used it exclusively in a small, stylized garden where blue lavender and other perennial herbs give a succession of

bloom. The combination is striking and the garden always in color. 'Spartan', with many clusters of shapely, double, orange-red blossoms, is also a great bloomer.

Two other reliable red varieties are 'Heat Wave' and 'Fire King' with flower like small, perfect, fiery Hybrid Teas. 'Ole' produces large, brilliant, orange-red flowers, the petals intriguingly ruffled; and 'Roundelay', the "sunfast" dark red, never blues and is almost always the choice of children who visit our garden when they are asked which rose they prefer.

Other "everblooming" Floribundas include salmon 'Fashion' and the even prettier 'Pink Fashion' and 'Fashionette'. Most salmon and coral varieties and many of the lavenders are extra free flowering. The last mentioned are for the few, like our friend who visited us each year, notebook in hand, asking for the names and growers of all the "decadent looking ones."

'Circus', 'Circus Parade' and 'Joseph's Coat' are anything but decadent. Instead they make a riot of color, each flower buff, yellow and orange, and maturing to rose and rose-red. The small, very double blooms look well *en masse* or even as a low hedge.

The Grandifloras—which, after all, are just very large-flowered, tall-growing, elegant Floribundas—usually bloom heavily and often, though yellow 'Buccaneer' is an exception in our garden. 'Queen Elizabeth', the first and most famous, crimson 'El Capitan' and 'Pink Parfait' (very well named) are seldom out of bloom.

Few Hybrid Teas flower more prolifically than 'Tropicana', which has the added advantages of delicious fragrance and long-lasting keeping qualities when cut. Most of the corals bloom very well through the hot weather; 'Hawaii', for instance, 'Polynesian Sunset' and 'Coral



Taloumis

Rambler roses frame the window of a shingle cottage. They flower steadily from July until late in the season.

Seas'. 'Orange Flame', which produces more elegant blooms on single stems, is not quite so floriferous.

Some very old Hybrid Teas should be included for summer color. 'Peace', which has been with us since 1945 when Robert Pyle of Star Roses brought it over from France, was a creation of F. Meiland. Undoubtedly one of the great roses of all time, 'Peace' holds its own with hundreds of newer varieties, and outstrips many of them. Her descendants are now numerous, pale creamy 'Garden Party' being one of the best and most floriferous. I sometimes wish, however, that hybridizers would be more sparing in the use of 'Peace' blood. There are just too many seven-inch scentless, cabbage-like flowers in the modern rose garden. With a superb variety like gold and rose 'Chicago Peace', the size and dramatic quality are a delight, but some of the others lack distinction.

Another old variety which is still a stunner is wheat-colored 'Diamond Jubilee' (Jackson & Perkins 1947), created by Eugene Boerner. This is one of the "bloomingest" of roses. 'Break O'Day' of similar but deeper color, is another, if it is obtainable today. We once had a climbing 'Break O'Day' which bore

to the ground with its masses of bloom, a well set ten-foot cedar post on which it was trained.

Not only are there old Hybrid Teas worth growing, but roses much older than these which, because of their outstanding performance, we would not be without in our garden. Not so many decades ago "remontant" roses were the best we could hope for—plants which provided great masses of June color and meager flushes of bloom for the balance of the season. The red climber 'Blaze' is perhaps the best of the remontant varieties still loved and planted in most gardens. Improved strains provide fall bloom almost rivaling its June display, but as an "everbloomer" it cannot compare with more recent hybrids which may justly be called *summer* roses.

The small-flowered Ramblers which have been with us for many years ('Dorothy Perkins' was introduced in 1901) may be called summer roses, not because they bloom more than once per season but because they flower late and over a long period. They do not come into full color in New England until July, when the small, bright blossoms literally cover the canes, creating a bower of pink, white or red over fence, trellis or house roof. In



Taloumis

'Tiffany' is a representative Hybrid Tea rose, with large, deep pink, golden-based flowers.



Rockwell

'The Fairy' is a pure pink Polyantha rose, whose flowers are continuous in northern gardens from July until hard frost.

humid climates they are seldom grown now because of their susceptibility to mildew. On Cape Cod and the islands of Martha's Vineyard and Nantucket they are cherished, for mildew is seldom a problem in these breezy coastal regions (1967 being an exception).

A shrub rose which has all the virtues of a Rambler except the ability to climb, and none of its disadvantages, is that disease and pest-resistant little pink beauty called 'The Fairy', technically a Polyantha. The small, double, pure pink flowers are borne in large clusters appearing first in the north in July and continuing throughout the season until killed by hard freeze. Foliage is a glossy, bright green, and plants grow in symmetrical mounds which slowly increase in size until ultimately they reach shoulder height. The oldest of the many canes should be pruned out each year, and faded flower clusters removed regularly. Otherwise 'The Fairy' takes care of herself. Indeed she is allergic to chemical sprays.

If the beginner wants to be sure of summer color in his rose garden, let him visit public plantings and other rose gardens in his area, not in June but in mid-July and August, in order to note varieties which he observes there in full bloom. ♦

PHLOX

(Continued from page 31)

might be feared, especially grown in gentle shade. 'Gaiety' is scarlet, faintly tinted orange, while nearly true scarlet flashes from 'Joan' and 'Thunderbolt'. 'Starfire', the peerless deep red, is a marvelous, branchy clump of amazing floral output.

True blues are merely wishful thinking, but 'Lilac Time' is a tall, picturesque lilac. 'Russian Violet' could please those of exotic leanings in taste, and 'Vintage Wine' is richly claret.

Phlox drummondii for Bedding

While *Phlox drummondii* is annual, needing yearly replacement, this sprightly Texas native represents one of our most improved summer bedding plants. Untiring little clumps seldom over 1 foot high have twinkling clusters from pale yellow to brilliant vermilion. Blending is magical and the eyes often add sparkling interest. Particularly fine is the larger new 'Tetra' group.

Thus we find phlox eminently helpful for summer flowering—perhaps *P. paniculata* is really irreplaceable! No gardener's facilities or talents need be unduly strained by enjoyment of the easier kinds of phlox. ♦

SUMMER BLOOM IN THE ROCK GARDEN

Betty Jane Hayward



Taloumis

Sedum (at the center) and thyme (at the two sides) take naturally to growing among rocks. Their roots take hold in crevices and their flowers and foliage soften the harsh surfaces around them.

C ONTINUOUS bloom is more difficult to maintain in the rock garden, populated largely with alpine plants, than in the usual garden of perennials. Because of the distinctive character of their native habitat, mountain plants are unique in their behavior. With the first relenting of the cold and snow, the flowers appear, and they are quickly followed by the setting of seed to complete the cycle before the cold of winter again descends. When plants are introduced to sea-level the schedule changes little, hence the abundant bloom comes early.

Summer bloom can, however, be continued with a program of thoughtful planning. The double form of *Arabis albida*, for example, comes into flower after the single type has passed bloom and, being

sterile, continues well into early summer. In some plant families there are species whose blossoming will cover the entire growing season. Gentians, for instance, begin with early kinds from European mountains, and extend to mid-summer and into autumn with Himalayan and eastern species.

Nothing equals the violas for providing color the whole season through. By growing a selection of *Viola* species yearly, the garden will be supplied with fine bloom all season. Culture is simple; seed sown in spring in the frame will provide generous numbers to fill the spaces where color is wanted. These will usually live over winter to bloom with other early plants in spring. Alpine types can be found if desired, namely, *V. biflora*, *V.*



Hayward

The many-petaled flowers of the western genus *Lewisia* are still a novelty in most gardens. Shown here are hybrids of *Lewisia cotyledon*.

saxatilis var. *aetolica* and *V. elegantula* (*V. bosniaca*). However, the common hybrids of *V. cornuta* are easy to come by, and they are available in fine, clean shades of all the colors.

Rock-jasmine (*Androsace lanuginosa*) is a favorite in the alpine garden, its trailing stems with gray leaves displaying clusters of fine pink blossoms at the end.

There is always room for one or another species of *Campanula* in a rock garden. These are Carpathian harebells (*C. carpatica*).

Taloumis



A variation is var. *leichtlinii*, white with a colored eye.

Aster alpinus, which blooms in May and June, is the choice of many gardeners, with flowers of lavender, pink and white. Some, however, favor the dwarf forms of the New England aster (*A. novae-angliae*). They come into bloom in September and October in all the aster shades and colors.

Another member of the Composite family is the Virginia golden star (*Chrysogonum virginianum*) a worthy plant for a shady spot, valuable for continuous bloom.

Lewisia cotyledon hybrids, western American alpiners, have lovely flowers mostly in shades of pink, often striped. Their flowering period is satisfactorily long.

Some other reliable genera of plants to use in maintaining color throughout summer include these:

Campanula, with many low, compact types, some trailing among the stones, color cool and appealing, lavender, purple and white.

Dianthus, bringing brightness to the scene for many weeks.

Saponaria, trailing pink blossoms in the wall and down the slope when the color is most needed.

Saxifraga, the encrusted kinds, waving plumes of white above the lovely leaf rosettes.

Veronica, in some late varieties, bringing back a touch of blue always desired.

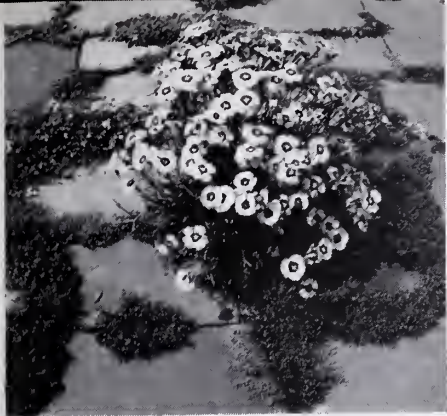
Sedum, in several newer varieties, low refined sorts, gray foliage, soft pink blossoms resting just above.

Common garden annuals, even in dwarf varieties, are never right to use, but there are several small kinds that are acceptable in a rock garden. Here are a few of the kinds most suitable to use:

Meadow-foam (*Limnanthes douglasii*), yellow, open blossoms, white in center.

Pink baby's-breath (*Gypsophila muralis*), airy foliage, dainty pink flowers all summer.

Diamond-flower (*Ionopsidium acaule*), tiny blossoms of violet.



Taloumis

Bright-faced pinks (*Dianthus*) and thyme grow well in the crevices of an area paved with flagstone.

Kingfisher daisy (*Felicia bergeriana*), blue daisy-like flowers.

Annual catchfly (*Viscaria nana compacta*, var. 'Loyalty'), fine blue.

Among small summer-blooming shrubs that fit the alpine garden, one of the finest is the evergreen garland-flower (*Daphne encorum*), which blooms intermittently throughout the season with fragrant clusters of rosy-pink flowers. The brooms (*Genista*) are also good rock-garden shrubs. *G. pilosa* is a low shrub with fine foliage and yellow flowers; *G. dalmatica* has spiny growth and also yellow blossoms. Other appropriate choices will be found in the genus *Cytisus*.

Two *Crocus* species that are autumn-flowering add to the rock garden's charm as the season nears its end. These are *C. kotschyanus* (*C. zonatus*), which has flowers of soft rosy-lilac, and *C. speciosus*, a fine type in brilliant bluish shades with golden stigmata.

For an unusual herbaceous plant, the hardy species of *Cyclamen* (*C. neapolitanum*) is something special. It has fine flowers of pink, also white, and beautifully mottled leaves.

The foregoing are but random choices. Many more are available at the gardener's discretion.* ♦

*A good book dealing with the subject of rock-garden plants is recommended. One of the best is "A Guide to Rock Garden Plants" by Anna N. Griffith, describing nearly two thousand species, with color plates of two hundred alpine plants. (Dutton, 1965) Another book to be recommended is "All About Rock Gardens and Plants" by Walter A. Kolaga, published by Doubleday in 1966. "Rock Gardening" is the title of a 1968 book by H. Lincoln Foster, published by Houghton-Mifflin.—Ed.



Hayward

Flowers of the autumn-blooming *Crocus kotschyanus* are soft rosy lilac. Corms are planted in July or August; leaves appear next spring.



Hayward

Aquilegia flabellata nana alba is a dwarf white-flowered form of a Japanese columbine, well suited to the rock garden.

COLOR IN THE SUMMER POOL

George H. Pring

SUCCESS or failure with water-lilies (*Nymphaea* species and varieties) depends to a great extent upon the pool in which they are to be grown. First consideration in locating a pool should be given to the amount of sunlight available. Full sun is essential for water-lily culture. The depth of the pool will depend upon whether the lilies are to be grown in boxes or in a natural soil bed.

It is not necessary to provide a continuous supply of fresh water for a lily pool. In fact, the tropical water-lilies do best in water of a warm and even temperature, and if the pool has a concrete or gravel bottom and is stocked with fish, snails, etc., the water will keep pure and clear. Only enough fresh water need be added from time to time to replace that lost by evaporation. The fish supply in the pool is important in order to keep down the mosquito larvae.

A water-lily pool may become discolored and weed control may be difficult if the bottom is completely soil-covered. For this reason many gardeners prefer to raise their lilies in large boxes or half barrels, setting these containers on the pool floor.

Tropical nymphaeas are large plants and need about 1 foot of water above them for proper development and at least a foot of soil in which to grow. If they are to be planted in boxes, a bushel of soil should be allowed to each plant; if planted directly in pools a foot of soil above any impervious bottom will suffice. Since the mature leaves of tropical water-lilies measure from 12 to 18 inches across and as many as eighteen leaves often radiate from the center of a plant, the plants need a spread of 6 to 8 feet. Unless this much space is allowed, the new leaves will be crowded out of the water and the flowers will be disfigured.

Shipped plants should be unpacked immediately upon receipt and placed in

water until they can be permanently planted. A bamboo stake at the planting spot in the pool will indicate the location of the dormant tuber should it "go to sleep" unexpectedly. It may be removed after the plant is established. The lilies should be kept in their pots until the planting spot is reached. The unbroken ball is then placed in the hole and firmed down, with the crown of the lily slightly above ground level. The soil surface should be covered with sand or gravel to prevent disturbance by fish, but the crown of the plant must remain uncovered.

Nymphaea leaves sometimes remain submerged after planting, but the next day they will extend their petioles and



Claude Johnston

'Mrs. George H. Pring' is a pure white, day-blooming tropical water-lily.



Claude Johnston

One of the tropical water-lily pools in Shaw's Garden, the Missouri Botanical Garden in St. Louis

reach the surface. Not more than 1 foot of water should be allowed above the crown at planting time. If the pool is so deep that a higher level is necessary, water may gradually be added as the plants develop, but 18 inches above the plant is the greatest water depth permissible.

The time to plant tropical water-lilies outside will depend upon the climate. A temperature lower than 70°F. makes the plants dormant, a condition from which they are slow to recover. In the Midwest, they can usually be planted by the middle of May, earlier in the South, and in the East and the Great Lakes regions the first of June is more likely to provide the necessary 70°F. minimum, both day and night.

During the summer, in addition to controlling the few pests which may attack water-lilies, all discolored leaves, faded flowers and seedpods should be removed. Natural-bottom ponds are subject to trouble from aquatic weeds. To keep these

weeds in check the bottom of the pools should be scarified once a week. Before water-lilies attain sufficient growth to shade the pool, algae can become an unsightly pest. If the pool is large and has no fish, copper sulphate may be used to kill the algae, the copper sulphate being placed in a cheese-cloth bag suspended from the end of a stick and dragged slowly through the pool until the water turns slightly blue. Water-lilies may be set out a day or two afterwards, but fish should not be put in the treated water for at least a week. For a small pool, or one which is already stocked with fish, permanganate of potash is a safer means of control, but its effect is not as lasting. About one teaspoonful of a saturated solution of this chemical to a gallon of water will be effective. It may be used not only before the lilies are planted but at any time during the growing season, although it will doubtless harm very young fish.

(Varieties are listed on the next page.)



Claude Johnston

'Director George T. Moore' is one of the blue-flowered day-blooming tropical water-lilies, shown here at the Missouri Botanical Garden, which for many years was headed by Dr. Moore.

DAY-BLOOMING TROPICAL WATER-LILIES

Blue

'Bagdad'
'Bob Trickett'
N. colorata (Tropical African species)
'Director George T. Moore'
N. gigantea (Australian species)
'Henry Shaw'
'Joe Cutak'
'Judge Hitchcock'
'Midnight'
'Mrs. Edwards Whitaker'

Pink

'American Beauty'
'General Pershing'
'Peach Blow'
'Persian Lilac'
'Pink Platter'
'Rio Rita'
'Shell Pink'

Yellow

'African Gold'

'St. Louis'
'St. Louis Gold'
'Sunbeam'
'Aviator Pring'

White

'Daisy'
N. gigantea alba
'Isabella Pring'
'Mrs. George H. Pring'

NIGHT-BLOOMING TROPICAL WATER-LILIES

Red

'B. C. Berry'
'Frank Trelease'
'H. C. Haarstick'

Pink

'Emily Grant Hutchings'
'James Gurney'
'Mrs. George C. Hitchcock'

White

'Missouri'

WILD FLOWERS IN SUMMER

Kathryn S. Taylor

MANY gardeners seem to assume that wild-flower gardening is confined to the spring season only and that wild-flower growing is therefore over for the year when the last trillium and yellow lady's-slipper have faded in the woodland garden. They thereby lose a splendid opportunity to add color and interest to their gardens which will carry through to frost.

At the beginning of summer the hand-somest of the slipper orchids, *Cypripedium reginae*, is at its best. It is more appropriate in a natural setting than in a more formal one, and can be grown in the summer wild-flower garden if given some sun, sufficient moisture and a humusy, neutral soil. The large pink and white slippers are borne on stout stems which are leafy to the top; this feature adds to the stately appearance of the plant.

Most of the summer wild flowers are excellent additions to the perennial bor-

Pipsissewa (*Chimaphila umbellata*), with its white-streaked evergreen leaves, is one of the favorite groundcover types of wild flowers. The waxy blooms appear in July and August.

Gottscho-Schleisner



Gottscho-Schleisner

A moist and humusy soil is needed to bring out the white and rose-colored flowers on the showy lady's-slipper (*Cypripedium reginae*) when it is brought into cultivation.

der, or they may be naturalized in a sunny field or other uncultivated area. A fine addition to the late June border is the smooth white penstemon, *P. digitalis*. The plant seems to have no insect pests; the large, shining, dark green leaves turn a bronzy color in autumn. The snap-dragon-like flowers are white faintly stained with violet, in compound clusters on stems about 3 feet tall.

July offers a greater choice of native species. The most showy of these is butterfly-weed (*Asclepias tuberosa*) with brilliant orange blossoms in upright, terminal umbels on leafy stems about 2 feet tall. This is the perfect plant for a sunny garden in dry, sandy soil. It will grow in a heavier one, but needs the lighter mixture if seeds are to self-sow. Butterfly-weed is a useful companion plant where hybrid lilies in tawny shades are featured. Two native lilies are in this color category but they demand moist





Gottscho-Schleisner

False-dragonhead (*Physostegia virginiana*) is especially good in its white variety, which is a less rampant grower.

conditions. Canada lily (*Lilium canadense*) with pendulous yellow bells is our most beautiful species. It prefers a cool climate and flowers in early summer. Turk's-cap lily (*L. superbum*) has orange-red reflexed petals which also nod. It blooms in August. Both species grow quite tall.

As a filler in the perennial border the pink form of the common yarrow (*Achillea millefolium*) may prove useful. The flowers last a long time but the color fades quickly. Another wild flower with a good pink color is queen-of-the-prairie (*Filipendula rubra*). This is a tall species with large, pinnately compound leaves and fluffy heads of small pink flowers.

Several groundcovers enliven the woodland wild-flower garden in July and August. These include pipsissewa (*Chimaphila umbellata*), shinleaf (*Pyrola elliptica*) and downy rattlesnake-plantain (*Goodyera pubescens*). The first two have nodding white flowers on short stalks rising above rosettes of shining leaves; the last has rather insignificant blossoms appearing in August, which rise similarly



Gottscho-Schleisner

The white species of turtle-head (*Chelone glabra*) does best in a moist and shady spot. It is showy in late summer.

above handsome rosettes of dark green leaves veined with white. The leaves are the chief attraction here.

A place should always be found for the harebell (*Campanula rotundifolia*), the daintiest of summer wild flowers. The nodding blue bells are borne throughout the season, the plants growing in sun or part shade in rock crevices or in moist, sunny meadows.

A particularly desirable species for the woodland garden is alumroot (*Heuchera villosa*), which produces clouds of tiny white flowers on stalks rising above large rosettes of shining green leaves. It blossoms from midseason to frost.

Where space permits, members of the genus *Rudbeckia* will provide an unfailing display in various shades of yellow. The familiar black-eyed-Susans (*R. serotina*) are biennials which, when once introduced, will self-sow freely. The brown-eyed-Susan (*Rudbeckia triloba*) with many smaller similar flowers on taller stems, starts flowering in late July and continues till frost.

A good background plant for the gar-

den is the cutleaf coneflower, *Rudbeckia laciniata*, also known as single golden-glow. Unlike the double form, it has no insect pests and is always attractive. This robust species grows 6 feet tall, has large divided leaves, and flower heads with long green cones and yellow ray flowers. Still more robust is the cup-plant (*Silphium perfoliatum*) with large opposite leaves, some of which grow together at their bases, forming cups which hold rain water. The flowers are pale yellow composites. The plant prefers sun but can stand a little shade. It blossoms over a long period.

August is about the best month for summer wild flowers. The most beloved is cardinal-flower (*Lobelia cardinalis*). The long racemes of clear red flowers are found in the wild along stream banks, usually in the shade. In the garden it seems to favor any situation. When once established it self-sows everywhere, the strongest seedlings often appearing in the rock garden where they soon become a nuisance. The plants are shallow-rooted, so offshoots and seedlings are needed to perpetuate the species.

A coarser and more indestructible lobelia for any except very dry soils is *L. siphilitica*, the great blue lobelia, and its white form. It adds much color to the midsummer garden but can become a pest. It is advisable to remove most of the faded flowers before the seeds mature.

The familiar black-eyed-Susan (*Rudbeckia serotina*) succeeds in the garden as well as in the wild. Its brilliant yellow flowers, seen from July onward, self-sow freely.

Three August-flowering species should be standbys in the cultivated garden. The first of these is swamp rose-mallow (*Hibiscus palustris*) with large clear pink blossoms opening one at a time in terminal clusters over a long period. The plants are very strong growers. They prefer a moist situation but do well in garden soil. The other two have small white blossoms in many-flowered groups. Culver's-root (*Veronicastrum virginicum*) is a tall plant with leaves in whorls around the stems and flowers in branched spikes like an overgrown veronica. It deserves to be better known. The white form of false dragonhead (*Physostegia virginiana* var. *alba*) flowers over a long period and is especially good in the garden since it is not so rampant as the commoner pink species. The blossoms are crowded in terminal spikes.

Pink turtlehead (*Chelone lyonii*) adds color to the late summer landscape and will grow in a variety of situations, blooming into the fall. The white species, *Chelone glabra*, is best in a moist and shady spot.

The most spectacular of late summer wild flowers is probably tall ironweed (*Vernonia altissima*). The spreading clusters of rich purple flower-heads on 7-foot leafy stalks dominate the moist wild-flower garden in full sun. This composite makes a fitting climax to the summer season. ♦

Gottschö-Schleisner





Taloumis

SUMMER IN THE HERB GARDEN

Priscilla Sawyer Lord

SUMMER is the season when the gray and green of foliage enhances the wide array of color that prevails in my herb garden. Although many herbs produce small, pastel-tinted flowers, there are others that make themselves conspicuous with a veritable blaze of color. Purple sage, the little pink-lined flower of pot marjoram, valerian in red, pink and white, crimson bergamot, the brilliant yellow and orange tones of calendulas, the dancing white feverfews and the cooling, chartreuse tones of lady's-mantle, together with the tapering columns of the heavily perfumed, yellow-green flowers of ambrosia, are especially noteworthy.

Actually, in most well-planned herb gardens there is no lull in flowering from spring to fall. Moreover, even a small patch of herbs is ever alive with winged creatures—bees, birds and butterflies.

Early and Shade-loving

Most herbs are sun-loving plants but those of early bloom prefer shade. Notable among these is sweet woodruff (*As-*

The airy midsummer flowers of lady's-mantle are chartreuse in color and long-lasting.

perula odorata)*, an ideal groundcover with neat whorls of tiny, lanceolate leaves and sheets of minute white blossoms. Also white and shade-loving are the blossoms of bloodroot (*Sanguinaria canadensis*). The shy-appearing bloom of wild-ginger (*Asarum canadense*), strangely red-brown in color, is hidden under the heart-shaped leaves. This is also the habit of violets which appear in May, especially the sweet English violet (*Viola odorata*).

Two herbs which grow in either shade or partial shade are Johnny-jump-up (*Viola tricolor*), a self-sowing annual also known as heartsease, and bugleweed (*Ajuga reptans*), a groundcover with spire-like flower clusters of pink, white or blue. Both like to take over the garden.

Thyme and Lavender

Another freely flowering groundcover, one that is essential to the herb garden, is thyme. Species and varieties are numerous and all may be used in cooking. *Thymus lanicaulis*, gray and woolly, bears showy spires of pink flowers in June, followed by *T. alsinoides*, pale lavender, in July. There is hardly a month in the growing season when some form of thyme is not showing buds or blossoms. Helen Noyes Webster listed all the thymes in "Herbs: How to Grow Them and How to Use Them."

English lavender (*Lavandula officinalis*) and the more compact form, *L. vera*, flourish in the heat of summer. The neat, gray foliage is topped with lengthy, slender spikes of pale blue flowers, for several weeks creating a lavender-blue mist. For a succession of lavender bloom with other kinds, read Margaret Brownlow's "Herbs and the Fragrant Garden."

Irises and Their Companions

In early June two old-time irises come into flower: *Irís florentina*, a lovely

* Unless otherwise mentioned, all plants referred to are hardy perennials.

Santolina virens resembles lavender-cotton (*S. chamaecyparissus*). Both have small yellow heads of flowers.

white, shaded with pale mauve, wearing an orange-yellow beard, and *Iris pallida*, pale blue; both are delightfully fragrant. June also brings us the salad burnet (*Sanguisorba minor*) carrying blossoms which look like burrs or raspberries; the subtle color is a combination of both. For background use, angelica (*Angelica archangelica*), a biennial 6 to 10 feet tall, bursts forth with dome-shaped umbels of white, fragrant flowers that the bees love. Notably dramatic in its appearance is borage (*Borago officinalis*), a self-sowing annual which bears loose, nodding clusters of azure-blue, star-like flowers from June to August.

Sweet cicely (*Myrrhis odorata*), lacy and luxuriant, with highly aromatic foliage, begins its performance in June, bearing showy umbels of delicate white blossoms. Another decorative ornamental from June to mid-July is clary sage (*Salvia sclarea*), a handsome biennial, which self-sows readily. Heart-shaped, wrinkled leaves cloak the spikes of flowers standing tall and handsome, to 4 feet, in shades of pink, opalish, and blue. More intense in its rich, purple-blue spikes is blue salvia (*Salvia farinacea*), treated as an annual which blooms from July on. Feverfew (*Chrysanthemum parthenium*), which produces white daisy blossoms in June, is recurrent if cut back. Unfolding its bloom each morning until noon, annual flax (*Linum usitatissimum*) and the perennial blue flax (*L. perenne*), both carry their dainty blooms on willowy stems.

Heavy, heady fragrance is brought to the June garden by the clove-pink carnation (*Dianthus caryophyllus*), a biennial, and the rose. Among roses, I think of three favorites: the autumn damask rose, (*Rosa damascena bifera*), the cabbage or Provence rose (*R. centifolia*), and the vigorous rugosa rose (*R. rugosa*).

The lilies in my herb garden are delightful to both eye and nose, especially the madonna lily (*Lilium candidum*) in



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late June, with its waxy white blooms. The scarlet Turk's-cap (*Lilium chalcedonicum*) and the tiger lily (*Lilium tigrinum*) are midsummer flowers.

July and Later Blooms

In July the herb garden bursts forth in golden glory with drifts of lady's-mantle (*Alchemilla vulgaris*) and lavender-cotton (*Santolina chamaecyparissus*). The leaves of the lady's-mantle resemble the pleated folds of a lady's cape and the toothed edges hold dew-drops until well after noon. The corymbs of small, airy, chartreuse flowers are long lasting and much more satisfactory in arrangements than baby's-breath. This plant flourishes in shade or full sun. Lavender-cotton, with its finely cut, closely set foliage looks more like coral formations than true leaves. It can be used in rock garden, herb bed, or in almost any sunny setting. Clusters of button-like blooms of deep yellow appear in late June and last well into August. Near the sea it flowers profusely. Since it is a fire-resistant plant, it is recommended around public buildings, especially those built of wood. The green-leaved form, *S. virens*, has even narrower leaves than the gray and its compact heads of bloom are lemon-yellow.

Wild marjoram (*Origanum vulgare*) holds its small showy pink flower heads above slightly pungent foliage, beginning in late June and lasting into fall. Two cuttings of this in a summer arrangement add interest to the composition and keep the water fresh (flower-arrangers please



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Any of the many varieties of sage are appropriate to the herb garden. Pineapple sage (*Salvia elegans*), shown here, roots easily in water.

note). Hyssop (*Hyssopus officinalis*) makes a sturdy 2-foot bush with one-sided spikes of white, blue or pink blossoms.

In July the annual herbs open their color pageant. Nasturtiums dance in brilliant gowns till frost, as do pot-marigolds (*Calendula officinalis*). The opium poppy (*Papaver somniferum*) flaunts pink, white or scarlet petals. The painted daisy (*Chrysanthemum cinerariaefolium*) has attractive rosy-red rays. This plant has insect repellent qualities, as do many other herbs.

Bergamot and bee-balm (*Monarda* species) may have large showy flower-heads of red, purple, lavender, a good clear pink, or white. This is one of the few herb genera of modern gardens which had its origin in North America.

Alliums begin their flowering in July. Chives (*Allium schoenoprasum*) with purple clover-like blossoms, *A. cyaneum*, a blue-flowered species, and *A. senescens*, a rose-flowered kind, are only three of the nearly 500 alliums.

For height and background accent, a planting of two annual herbs brings bright-colored foliage into the garden. Orach (*Atriplex hortensis*) is easily recognized by its beet-red, wavy leaves, and perilla (*Perilla frutescens*) in purple bronze, by its resemblance to a coleus.

For middle-ground plantings, sea-holly (*Eryngium maritimum*) with its silvery, steel-blue, thistle-like heads is highly decorative in form and color. Equally attractive are the bluish leaves and stems. Chicory (*Cichorium intybus*), a biennial, can be a pesky weed, but its china-blue flowers are exquisite. Elecampane (*Inula helenium*) is a tall, rough-leaved herb with large, ornamental, golden blossoms. It can grow to 5 feet. Tall too, but dainty, is the garden-heliotrope (*Valeriana officinalis*) with its small flowers of white, pinkish, red or lavender, in large clusters at the ends of upright stalks. Cats love it! False-indigo (*Baptisia australis*) makes an excellent background plant in a border. Its lavender pea-like blossoms resemble lupine and its seed pods are black. Foxglove (*Digitalis purpurea*) is handsome and tall with velvety, spotted, bell-like flowers in colors varying from white to deep rose and salmon. Tallest of all is the hollyhock (*Althaea rosea*), which cannot really be tamed, growing where it will with its gay ballet-skirts for blossoms in myriad colors.

While many of these bloom into August, the month itself ushers in the green plumes (lime-shaded and literally dripping oil) of ambrosia (*Chenopodium botrys*), a hardy annual. Tansy (*Tanacetum vulgare*) blossoms in flat cymes of rayless, bright yellow blossoms, each head carrying hundreds of tightly packed florets. I prefer the variety *T. vulgare crispum* with curly foliage and more refined habit.

Last to blossom in the herb garden is the meadow-saffron (*Colchicum autumnale*),* with globe-shaped violet blooms like huge crocuses. When they appear in September, they are spelling goodbye to summer. ♦

*For a closely related autumn-flowering crocus, see page 41.

GERANIUMS FOR PERPETUAL FLOWERING

Mary Ellen Ross



Taloumis

When ground space is limited, geraniums can ornament a fence.

GERANIUMS are the most versatile of all flowering plants for summer and fall color in the garden. They are grown the world over as outdoor bedding plants and for window boxes, pots and tubs, as well as for pot plants indoors in sunny windows. Geraniums can be grown as hanging plants, trailers, or in bush or tree form.

They need a great deal of sunshine and should be watered thoroughly when dry. They can be grown in almost any kind of soil but for pot plants on a sunny terrace it is best to use peatmoss and sponge-rock (perlite) with the loam to hold moisture

longer. Feed them about every two weeks with any good fertilizer recommended for house plants, following the manufacturer's direction.

Although most geraniums are susceptible to aphids, few other insects attack them. The aphids can be controlled with any good plant bomb or spray.

During wet, humid weather geraniums may be susceptible to diseases. There is little that can be done when the foliage starts deteriorating except to clean the plants off as soon as the foliage has dried. Some yellowing of the foliage is normal. Picking off dead leaves and flow-



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A ceramic container in basket-ware design makes an attractive base for geraniums that are brought outdoors for the summer.

ers is an automatic chore when growing any kind of geranium.

The one most frequently cultivated is the "zonal" or "horseshoe" geranium (*Pelargonium hortorum*). The large double blooms are typically salmon-red, salmon-pink or white, but they are also available in dark purple, bright orange and lovely soft pink.

While these with their flamboyant tones may be the most popular, their bold beauty can be enhanced and softened by planting them in combination with other types. Ivy-leaved geraniums, for example, which trail or climb, may be effectively planted at the edge of a window box or pot with large double geraniums. They not only add color with their own beautiful blooms, but can take the place of the more common trailing vinca (*Vinca minor*) or German-ivy (*Senecio mikanioides*). Planted in hanging baskets, ivy geraniums make beautiful specimens that are just as colorful as hanging begonias.

Ivy-leaved varieties come in many colors the same as zonal geraniums. Flowers

are large and may either be double or single.

The scented-leaved geraniums planted in the garden or in pots or tubs give a cool refreshing fragrance to hot summer air. Since they are rampant growers, their decorative foliage can be picked freely to add greenery to cut flowers or they can be gathered to make "tussy-mussies," which are small nosegays made entirely of scented foliage. The leaves can also be dried for potpourris or sachets to scent the linen closet and keep the moths away. Scented-leaved geraniums also have culinary value. They can be used in punch bowl, cake, candy, jelly or butter. Rose geraniums are ideal for this purpose. 'Rober's Lemon Rose' has the strongest scent.

The fancy-leaf geraniums are gems to use with plain-leaved zonals. Their foliage glitters in shades of silver, bronze, reds and yellows, adding to the lights and shadows of the garden.

Many of the species geraniums bear little resemblance to the more familiar types. The scented foliage of southernwood (*P. abrotanifolium*) is like the herb called "Old Man Southernwood," but smaller growing. Its feathery gray foliage twists and curls on wiry stems and it can be easily trained into a miniature bonsai. Southernwood being hardwooded, it will grow for years in the same pot just like a true dwarf bonsai. There are other species geraniums of similar habit, such as the absinthe geranium (*P. divaricatum*), which also has feathery gray foliage. *P. dasycaulon*, a sturdy, succulent, cut-leaved variety, also *P. echinatum*, the "sweetheart" geranium, and *P. stapeltonii*, the "pink sweetheart" geranium, resemble cacti with their spiny stems. Others in this group are the poinsettia types, which have curled and twisted petals.

Gardeners with limited space might be interested in the miniature and dwarf geraniums. These are like tiny varieties of the zonal geranium. They have the same type of blooms and leaves but on a smaller scale. Flowers come in double, single or poinsettia types in any shade. Miniatures are perfect for edging or win-

dow boxes and indoors as house plants in a sunny window.

Varieties especially recommended in the groups mentioned above are these:

Zonal Geraniums

Irene strain—abundance of early flowers

Cardinal—dark red

Toyon—scarlet

Salmon Irene—salmon

Rose Irene—rose pink

Genie—bright pink

Penny—neon pink

Olympic strain—short, compact growth; double flower clusters

Red Perfection—improved form

Welcome—two-toned salmon

Fiat strain—oustanding for bloom performance, sturdiness, and color range

Salmon Fiat—salmon pink

Fiat Supreme (Dawn)—true light pink

Enchantress Fiat—shell pink

Fiat Queen	} carnation-edged (Picotee) petals
Royal Fiat	
Princess Fiat	

Pink Cloud—sturdy double light pink

Galaxie—rose pink

Bred to stand hot summers of Midwest

Unusual colors in zonals

Doubles

Gleam	} orange-salmon
Orange Ricard	
Orange Glow	
Marquis de Montmart—dark purple	
Patience—rosy purple	
Jeanne Viand—demure lavender	
Always—peachy cream-white	

Singles

Frau Berta Kamm—two-toned salmon
Mme. Kovaleski—bright orange

Apple Blossom types

Honeymoon—salmon-pink
Carmel—white with pink edge
Purple Heart—violet-purple blend
Painted Lady
Souvenir de Mirande

Ivy-leaved

Santa Paula—soft lavender-blue
Galilee—medium double pink
Comtesse de Grey—light pink single
Mexican Beauty—rich blood red
Beauty of Eastbourne } brilliant
Barbara Worth } cerise
Nutmeg Lavender — small double



Taloumis

Since geraniums have an appeal in almost any situation, a simple rectangular box on a low wall beside stone steps serves them well.

lavender-rose with peach-scented foliage

Snowdrift	} the best
Mrs. Banks	
	whites

Fancy-leaved

Gold and bronze

Alpha
Green Gold
Golden Oriole
Bronze Beauty

Silvery

Mme. Salleron
Mrs. Parker
Flowers of Spring

Tricolored

Skies of Italy — scarlet, red, gold, brown, green
Miss Burdett Coutts—silvery-white, pink, red, brown
Happy Thought—bronze and green
Mrs. Cox } red, orange, bronze
Mrs. Pollock } gold

Poinsettia Types

Curled and twisted petals
Pink Poinsettia
Morning Star—salmon-tangerine
Noel—pure white ♦

HEATHS AND HEATHER

Harold W. Copeland

MORE than any other species in the garden, heaths (*Erica* species) and heather (*Calluna vulgaris*) provide continuous summer bloom; in fact, careful selection of varieties gives flowers every month in the year. Many individual plants show floral color for two and three months. Equally attractive is the foliage, which contains tones of green, gray, yellow, gold, orange, pink, flame red, copper and bronze, according to variety.

Plants range in height from 2 inches to 5 feet. There are endless forms such as dwarf pincushions, low mats for groundcover, bushes densely compact or loosely upright, and miniature evergreen trees. Flowers, single or double, may be white or shades of pink, mauve, rose, coral, scarlet, crimson, lavender or purple.

Heaths and heather are adaptable to many situations: rock garden, groundcover, inner border for shrubs, edgings and walks. Best of all is an area devoted to them, with dwarf evergreens as an accent.

They should be planted in full sun and in acid soil. Copious amounts of peat should be incorporated in the bed, and

two or three handfuls of peat mixed in each planting hole. Excellent food is leaf-mold, decayed pine needles and compost. Rich soil, however, also clay, lime, manure and fertilizer should all be avoided.

Except for the very low-growing varieties, heaths and heather should be pruned early each spring (in New England the time is April). Trimming keeps plants compact and bushy, also improves flowering and vitality. (Winter-blooming heaths, not included here, should be trimmed immediately after flowers fade.)

In most areas the procedure for providing winter protection is use of a thin cover of pine needles or marsh hay. Also ideal for the purpose are cranberry vines (*Vaccinium macrocarpon*). In all regions it is good practice with small plants to place rotted pine needles or peatmoss closely around the base.

Following is a brief description of some of the better summer-blooming cultivars of heaths and heather now obtainable in the United States. Given is period of bloom, height in inches, color of flowers and comment.



Talouis

White heather and the more usual purplish-pink-flowered form both show up effectively against the background of a rock garden. They require full sun and acid soil.

DESCRIPTIVE CHART OF HEATHS AND HEATHERS

Erica ciliaris—Dorset heath—blossoms July–October

'Mrs. C. H. Gill'	12"	cerise red	a striking color
'Wych'	18"	white	flowers attractively flushed pink

Erica cinerea—Bell heather—neat, well proportioned plants with tiny leaves

'Alba Minor'	6"	white	dwarf and compact; blossoms June–Oct.
'Atrorubens'	9"	ruby	long sprays, floriferous; blossoms July–Oct.
'Atrosanguinea Smith's Variety'	6"	scarlet	fine color, floriferous; June–Sept.
'Coccinea'	4"	carmine	dwarf prostrate; intense color; June–Sept.
'Eden Valley'	6"	lilac	white base and lilac top give lovely bicolor effect; July–Sept.
'Foxhollow Mahogany'	12"	mahogany	floriferous; July–Sept.
'Golden Drop'	6"	pink	golden copper foliage becomes rusty reddish copper, winter; rarely flowers; choice
'P. S. Patrick'	12"	purple	one of best of this color; floriferous; Aug.–Sept.
'Velvet Knight'	12"	black purple	darkest of all flowers; July–Aug.

Erica hybrids

'Dawn'	10"	rose	floriferous and long lasting; July–Oct.
'Williamsii'	9"	pink	plant and foliage especially attractive; young growth golden becoming golden green, finally bronze, winter. A good spreader; July–Sept.

Erica tetralix—Cross-leaved heath—flowers in terminal clusters, June–Oct., all with silver-gray foliage

'Alba Mollis'	9"	white	
'Constance Underwood'	9"	crimson	
'Ken Underwood'	12"	cerise	
'L. E. Underwood'	9"	terra cotta	

Erica vagans—Cornish or wandering heath—flowers in upright plumes; indescribably beautiful plants, foliage and flowers; Aug.–Oct.

'Lyonesse'	18"	white	
'Mrs. D. F. Maxwell'	18"	rose cerise	
'St. Keverne'	18"	salmon pink	

Daboecia cantabrica—Irish bell heather—large flowers of egg shape, glossy foliage; June–Oct.

'Alba'	24"	white	spikes 12 in. long
'Praegerae'	18"	salmon pink	
'Hookstone Purple'	24"	purple	

EDITOR'S NOTE: Many of the cultivars named are available from only two nurseries—H. V. Lawrence Inc., Falmouth, Mass. 02541 and Sylvan Nursery, 1028 Horseneck Rd., South Westport, Mass. 02790. They specialize in heathers and have access to cuttings from the Copeland garden.

	Height	Flower color	Comment
'Alba Carlton'	18"	white	flowers on laterals as well as main spike
'Aurea'	12"	mauve	golden foliage becomes rusty red in winter
'Barnett Anley'	18"	soft purple	heavy clusters on long spikes
'Beoley Gold'	18"	white	bright golden foliage
'Blazeaway'	18"	mauve	golden foliage becoming red in winter
'County Wicklow'	10"	pink	profuse double flowers, good for cutting
'C. W. Nix'	24"	crimson	long graceful tapered stems
'Else Frye'	12"	white	double flowers
'Foxii Nana'	4"	mauve	delightful dwarf pincushion, flowers scarce
'Golden Feather'	18"	mauve	feathery golden foliage with orange hue, winter
'Gold Haze'	24"	white	bright golden foliage; similar to 'Beoley Gold' which is more highly colored but has fewer flowers
'Hammondii Aureaefolia'	18"	white	strong grower; foliage yellow in spring
'H. E. Beale'	24"	pink	profuse double flowers; sprays 12 in. long; excellent for cutting. Two newer varieties, 'Elsie Purnell' and 'Peter Sparkes', are sports of 'H. E. Beale' and considered better when obtainable.
'Humpty Dumpty'	4"	white	unusual and choice; a series of hummocks like dwarf mass of miniature conifers; rarely flowers
'J. H. Hamilton'	9"	pink	double flowers; finest of pinks for color
'Joan Sparkes'	9"	mauve	double flowers; good for cutting
'Joy Vanstone'	18"	pink	golden foliage becoming orange in winter
'Mair's Variety'	24"	white	long spikes; good for cutting
'Mrs. Pat'	6"	mauve	foliage tipped vivid pink in spring
'Mrs. Ronald Gray'	3"	reddish-purple	favorite among the prostrate growers
'Orange Queen'	24"	pink	foliage golden progressing to orange
'Prostrate Orange'	6"	pink	similar to above but prostrate grower
'Robert Chapman'	18"	soft purple	golden foliage becomes orange, flame and red; superior among colored foliage cultivars.
'Ruth Sparkes'	9"	white	light gold foliage, some stems reverting to green; a new selection now available is claimed not to revert
'Silver Queen'	18"	mauve	woolly silver-green foliage
'Sister Anne'	4"	pink	distinctive woolly gray-green foliage forming a crinkled tuft
'Spitfire'	12"	pink	golden foliage becoming fiery bronze-red, winter
'Tib'	18"	crimson	double flowers on long spikes; floriferous



Taloumis

A garden of tuberous begonias growing by the sea. They bloom steadily in a great variety of colors from June until the first frost.

TUBEROUS BEGONIAS

For continuous summer bloom

Marion P. Hosmer

WHILE more and more amateurs are growing tuberous begonias, many otherwise adventurous gardeners still believe these accommodating plants to be difficult. On the contrary, they are among the most adaptable of summer-flowering tuberous plants. They will do well in all but the most hot and humid sections of the country; they are the only plants that will give masses of summer color in the shade in northern areas, and they will

grow in almost any soil provided the drainage is good. Here on the coast of Maine, with its cool airs from the sea and foggy, dewy nights, tuberous begonias will even grow in the full sun, if they are planted closely enough to shade each other. And they will bloom from June to the first frost in all colors except blue.

Whether one's garden is large or small, formal or informal, beds or shrubberies, or whether summer gardening is confined

to potted plants on porch or terrace, there are varieties of tuberous begonias that will lend themselves to the situation.

If one wants quantities of these delightful plants, the most economical way to acquire them is to grow them from seed (about \$4.00 a packet for choice mixtures); but this is a tricky business and really requires experience and greenhouse facilities. Seedling plants can be bought in May and June (\$25.00 a hundred), potted plants may be purchased from nearby growers (the most expensive way), or one may easily grow fine plants from tubers bought for 50 to 75 cents each. As it is simple to keep these over for growing year after year, the initial cost is the last. The tubers may also be divided like potatoes or dahlias with a bud to each section, or cuttings may be taken to increase one's stock of plants.

The large-flowered types, single as well as double, are breath-taking both in form and color. For bedding purposes, singles, with their blossoms of lighter weight, stand up better to wind and rain; but for terrace and porch, where each huge blossom is an event, the double-flowered forms are fascinating.

The hanging-basket begonia (*Begonia tuberhybrida pendula*, often listed as 'Lloyd') is for window boxes, wall pots, on top of low walls—any shaded spot that needs brightening and has protection from the wind. Flowers from these plants are smaller but much more plentiful, and their colors and surrounding foliage are as charming as in the large-flowered kinds. This begonia may need pinching back early in the season if no more than two branches come from the tuber.

A third type, spoken of as "Begonia multiflora," though it is not a true species, *really* gives continuous summer bloom. Masses of small rosette-like blooms in sprays of a dozen or more are produced freely all through the season and through all weathers. The colors are beautiful and the dark green leaves are of the familiar begonia form. The plants are branching and compact in growth, and will stand much more rain, wind and sun than their larger relatives.

Cultural Directions

Start the tubers for all these types six to eight weeks before they are to be set out in the garden; they will then begin flowering in June. Wait to start them until the pink sprouts in the concave top of the tuber are showing. Fill a flat with coarse, hardwood leafmold, or an organic substitute which will not pack and become soggy. Peatmoss is apt to do this and therefore is not recommended for starting tubers. Space the tubers to allow for heavy root development, and cover with half an inch of leafmold. This covering is *most* important as it allows full development of roots from the *top* of the tuber as well as the sides and bottom. Water carefully to achieve even moisture but *not* sogginess. Place flat in strong light, not direct sun, in a temperature of 65 to 75 degrees. Guard against spindly growth by moving to a cooler room if necessary. When the first two leaves have reached equal size, pot the plants, or set them out in prepared beds if the weather is favorable—tomato-planting time in your area.

Pot Plants

A standard potting soil is two-thirds partly rotted leafmold and one-third coarse sand, while another good mixture is one-third sandy loam, one-third peatmoss and one-third well-rotted or dehydrated cow manure. Begonias do not root deeply, so use azalea pans rather than deeper pots. Mix one handful of fish meal with enough soil to fill two-thirds of the pot, place plant in pot and fill in around root mass. Firm, and finish by covering top of root mass lightly with a quarter-inch of potting soil. Water carefully.

Outdoor Planting

If drainage is poor in your outdoor bed don't plant begonias there if you can avoid it. But if there is no place else, add one-half coarse sand to the existing soil. If there is no drainage problem, or after the sand has been added, spread on top of the soil a half-inch layer of 60 per cent dehydrated cow manure, 30 per cent Milorganite and 10 per cent bonemeal. Work this mixture into the top few inches of

soil in early April and let the bed blend and settle. Water several times if there is no rain.

When planting, place a handful of fish meal under each plant, and barely cover the roots with soil. Avoid letting soil get into contact with the plant's stalk as this may cause rot. Stake when planting to avoid damage to the tuber. Keep watering carefully until new roots have formed and top growth is evident.

Fertilizing

When active growth begins after transplanting, feed once a week with any good liquid plant food with a formula of 8-8-4 or 10-10-5, one tablespoon to a gallon of water, until the plants begin to flower. Switch then to a once-a-week feeding of one tablespoon of Atlas fish emulsion, plus one tablespoon of a 2-10-10 formula to each gallon of water. The first formula is to achieve strong plant growth, the second to strengthen stems and blossoms and give energy to carry the tubers over the resting period.

Watch the plants to judge when the feeding is right. Keep the leaves a deep green and of a healthy thickness. Don't worry if the leaves turn under *slightly*, but much "roll" indicates too much food. If the leaves become yellowed, the plants are starving; if blue-green, there is too much nitrogen in the fertilizer.

Problems to Watch For

Newly transplanted begonias will often drop buds and flowers until roots develop. The same thing will happen in extremely hot weather, or if the soil is extremely dry or sopping wet. Moderation in all things is the rule with these charming plants, in their feeding likes as well as in the "not too much shade," "not too much sun" rule for their location.

Sometimes a plant becomes extremely bushy, with so much foliage that the flowers are unable to come through. In this case clip off some of the upper leaves to let in more light. Take off only the *leaf*, leaving the stem on the plant. If the stem is cut or broken off close to the plant it will mold and carry the infection into the main stem, destroying the plant.



Taloumis

The dwarf form of the "multiflora" begonia, used as a border plant, accentuates the tuberous begonia's size.

Too much bushiness may be overcome when planting the tubers by rubbing off all but two or three of the strongest sprouts with the thumb. Keep the plants clean of all old flowers and fallen petals, leaving the flower stems *on*, and being careful to clean all debris of any kind out of the crotches of the leaves. If mold does develop in a main stem it can sometimes be scraped clean with a knife, dried and dusted with Zerlate. These difficulties usually apply only to the large-flowered begonias.

A serious disease is a new variety of mildew that has become widely spread since 1951. Spraying with Mildont or dusting with sulphur at the first sign, or even before it appears, will control this. If mildew should be serious enough to spoil the plants for the season, don't discard the tubers. The disease is not carried over on them and they will probably do well the following year.

Plants should be allowed to continue growing as long as possible in the fall. The first light frosts that blacken the foliage will not harm the tuber, but they should not be subjected to a hard freeze. Lift the plants with a ball of soil and set in a frost-free place to mature. When the main stems come cleanly free of the tuber, wash off all soil, dry in the sun until the tuber is hard, and store in open flats in a cool dry place (40 or 50 degrees) during the winter months. ♦

COMBINING COLORS IN THE SUMMER GARDEN

Robert H. Rucker

COLOR in the summer garden is the direct result of the creative planning that is made early in the garden year. There are many sources of color in every garden, and every plant—be it tree, shrub, grass or auxiliary—contributes. Seasonal color is usually provided by herbaceous plants. While those of a soft and succulent habit of growth usually have a short life span, it is just as necessary to plan their use as enrichment material as it is to plan permanent plantings.

Probably the most popular group of plants for summer color are the annuals, yet certain of the perennials contribute greatly in the over-all picture. While many old favorites remain in continued use, the many exciting new introductions each year make the challenge ever more stimulating and rewarding.

Two Types of Planting

The most spectacular displays in the summer garden are apt to be the result of deliberate and careful planning. To the average home gardener there are usually two avenues of expression open in the use of color. Both are dependent on the style of garden desired.

The first is the conglomeration planting, which is quite informal in character and is really a happening in the truest expression. Practically every size and type of plant can be found here. The effect is one of complete continuity of chaos—yet very colorful and a source of pleasure to the “green thumb” gardener. This garden provides something for everyone at all times and usually is overgrown and lacking in maintenance. The degree of beauty lies in the abundance of material which, due to its nature and unrestricted habit of growth, provides the

owner much pleasure. A conglomeration planting should be planned so that a feeling of unity exists among the various plants. By careful grouping of sizes, colors and textures, much added beauty can be achieved.

The second type is the semi-formal or precisely planned planting. In this, beauty results from the ordered relationship existing among all the plant materials. The combination of sizes, colors and textures creates a complete harmony. It is here that selection and placement of the plants become all important in developing the pattern of beauty. The potential combinations are endless and all contribute to the pleasant environment for people.

Color Suggestions

Many gardens are developed in special color combinations; these are always a challenge. Often a color value is carried into the garden from the residence. This can become difficult, even monotonous when the owner attempts an all one-color garden. As most gardeners know, some colors are still not available in plant materials. Practically no flowers provide full value of a color, but rather many variations in the tints and tones.

The strong reds of celosia flowers combine with the soft blue of ageratum to provide a strongly accented note in the summer garden. The celosia also furnishes an interesting textural contrast.

Taloumis



The use of color in repetition can provide unity and rhythm in the garden design. The all-white garden is fairly easy to carry out, and is most refreshing on hot afternoons. In the illuminated garden white becomes most effective and very dramatic.

Perhaps no group of plants has given a wider range of expression than petunias, which provide a tremendous source of color in the garden. Petunias combine well with practically all other flowers and they are spectacular in mass plantings of one color. The F_1 hybrids have introduced many new color values, especially in blues—'Sugar Blues', 'Blue Jeans', 'Capri' and 'Mercury' all being excellent. Among the whites, 'Paleface', 'White Magic' and 'White Cascade' maintain their superiority. Masses of petunias with borders of ageratum or Joseph's-coat (*Alternanthera*) provide spectacular displays for three to four months.

A versatile plant for a neat and colorful display all summer is *Begonia semperflorens* for either partial shade or full sun. It combines well with other annuals and comes in white and in values of red and pink. 'Linda' and 'Matador' are very prolific and hardy. In combination with 'Dark Opal' basil they create a striking effect.

Certainly a summer garden would not be complete without some plantings of cockscomb (*Celosia argentea*). Of the "feather" or *plumosa* varieties, 'Golden Fleece' and 'Scarlet Plume' are worth trying. Among the crested types, 'Toreador' continues to be excellent. These plants are of dual value for color and textural qualities.

Zinnias are now available in many forms, sizes and colors, ranging from 'Thumbelina', a mere 6 inches, to the dahlia-flowered group, 36 inches tall. As to colors and forms, once again the hybridizers have "gilded the lily"! As one of the numerous types, creeping zinnias form an excellent border, with many small double yellow flowers.

Dahlias are also available in a variety of sizes and colors. With many gardeners, size is very important, but some dahlias



Talouis

An all-white garden is refreshing on hot summer days. Shown here are white lilies, flowering tobacco and sweet-alyssum.

are so large as to be difficult to use. The Unwin dwarf hybrids still remain valuable for border or intermediate plantings and are more in scale with other plants than the larger dahlias.

Blending of Colors

Dusty miller (*Centaurea cineraria* or *C. gymnocarpa*), also coleus, caladium, amaranthus and alternanthera, all grown for their foliage rather than their flowers, may be used as dividers between colors or to subdue intense colors. Coleus and caladium prefer partial shade, but in full sun the colors of coleus become more intense and the color pattern changes.

While a basic understanding of color is most helpful in creating dramatic effects in the summer garden, one should remember that plant colors are natural phenomena and natural colors blend beautifully. Bold use of color is always unified through the ever-present green of the landscape. It should be remembered that cool colors tend to recede and are soothing, whereas the warm colors advance and are exciting. Color must be used in relatively large masses to be effective, but the effect is also influenced by the distance from which color is viewed.

A gardener's selection of color combinations when plants are at their height of bloom can result in designs that become true personal expression. ♦

SUMMER-FLOWERING TREES AND SHRUBS

Seth L. Kelsey

MOST gardeners are content to depend on perennials, annuals, summer flowering bulbs and plants with showy fruit to give them color after the wealth of bloom that is provided by spring-flowering trees and shrubs.

However, there are many trees and shrubs that will provide welcome flower color during July, August and September.

Among shrubs an even greater variety of summer-flowering kinds is available in a wide range of form, growth habit and flower color. Any of them are ahead of the all too common peegee hydrangea (*Hydrangea paniculata grandiflora*),

whose profuse clusters of snowy white flowers in August and September turn color and become unsightly as the season progresses.

In the following list will be found some significant details about many summer-flowering trees and shrubs. Though not all are spectacular in flower, even the less showy have their own peculiar charm for those who will take the trouble to examine them closely, and most have added virtues in colorful fruit, attractive foliage or brilliant fall color. While not intended to be all-inclusive, this list will show that those who want summer-flowering trees and shrubs have a wide choice.

SUMMER-FLOWERING TREES

Zone	Name	Height in ft.	Flower	Time of bloom	Special notes
4	<i>Ailanthus altissima</i> tree-of-heaven	30-40	white	June- July	var. <i>erythrocarpa</i> has showy red fruit
7	<i>Albizia julibrissin</i> silk-tree	20-25	lt. pink	July- Aug.	var. <i>rosea</i> is hardier (5 or 6) and deeper color
3	<i>Aralia elata</i> Japanese aralia	25-30	whitish, lt. clusters	Aug.	sometimes shrubby; very prickly stems
4	<i>Aralia spinosa</i> devil's walking-stick	25-30	whitish, lg. panicles	Aug.	spiny stems, black fruit
5	<i>Cladrastis sinensis</i> Chinese yellow-wood	50-60	white or pinkish	July	
7	<i>Clethra delavayi</i> Delavay clethra	30-40	white, bell- shaped	July	
7	<i>Elliottia racemosa</i> southern-plume	14-16	fragrant white	July	frequently shrubby
7	* <i>Eriobotrya japonica</i> loquat	14-16	fragrant, white in panicles	July	large leaves, edible fruit

*An asterisk in front of the name indicates an evergreen kind.

Zone numbers indicate hardiness zones in the Arnold Arboretum Hardiness Zone Map. Copies are available at 10 cents each postpaid from the Arnold Arboretum, Jamaica Plain, Mass. 02130. Or see pages 32-33 in the Winter 1967-68 issue of PLANTS & GARDENS.

Heights given are those that may be normally expected from mature plants under average garden conditions. Substantially greater heights are often found in natural growths in areas where plants are native, or in gardens under unusually favorable conditions.

Times of bloom will vary in different climates and in different seasons. Those given are only an indication of what may be expected in the northeastern part of the country.



Taloumis

Sweetbay magnolia is deciduous in the North, somewhat evergreen southward.

Goldenrain-tree's showy panicles of yellow flowers are its leading feature.

Zone	Name	Height in ft.	Flower	Time of bloom	Special notes
5	<i>Evodia huphensis</i> Hupeh evodia	30-40	whitish	June- July	reddish-brown seed pods
6	<i>Evodia officinalis</i>	12-14	whitish	July	frequently shrubby
5-6	<i>Franklinia alatomahia</i> franklinia	18-20	white, cup- shaped; yellow stamens	Sept. to frost	frequently shrubby, crimson in fall
5	<i>Hibiscus syriacus</i> shrub althea (rose-of-Sharon)	12-14	white, pink, red, purple or violet	Aug.- Sept.	usually shrubby
4	<i>Kalopanax pictus</i>	60-80	white	July- Aug.	handsome tree
5	<i>Koelreuteria paniculata</i> goldenrain-tree	20-30	yel. in lg. loose panicles	July- Aug.	papery fruit
7	<i>Lagerstroemia indica</i> crape-myrtle	15-20	pink to red	Aug.	often shrubby
4	<i>Maackia amurensis</i> Amur maackia	20-30	white	July- Aug.	
7	* <i>Magnolia grandiflora</i> southern magnolia	50-60	fragrant, cup-shaped, white, 6-8"	May- Aug.	lustrous evergreen leaves
5	<i>Magnolia virginiana</i> (<i>M. glauca</i>) sweetbay magnolia	20-30	fragrant, white, 2- 2 3/4"	June- July	bright red fruit; half-evergreen in South
4	<i>Oxydendrum arboreum</i> sourwood	40-50	white, in long drooping panicles	July- Aug.	brilliant scarlet in fall
5	<i>Prunus subhirtella autumnalis</i> Higan cherry (hort. var.)	20-35	semi-dbl. light pink	Spring also Sept.- Oct.	

Summer-Flowering Trees, *continued*

Zone	Name	Height in ft.	Flower	Time of bloom	Special notes
4	<i>Sophora japonica</i> Japanese pagoda-tree	40-50	yellowish- white, rarely pinkish	Aug.- Sept.	weeping and colum- nar varieties avail- able
5	<i>Stewartia koreana</i> Korean stewartia	20-30	white, 2½- 3" across	June- July	orange fall color
6	<i>Stewartia monadelpha</i> tall stewartia	30-40	white, 1- 1½" across	July	slow to flower
5	<i>Stewartia pseudocamellia</i> Japanese stewartia	25-30	white, 2- 2½" across	July- Aug.	purple fall color; sometimes shrubby
6	<i>Stewartia sinensis</i> Chinese stewartia	18-20	white, 2" across	July	orange to orange-red fall color

SUMMER-FLOWERING SHRUBS

Zone	Name	Height in ft.	Flower	Time of bloom	Special notes
5-6	<i>Abelia grandiflora</i> glossy abelia	4-5	white, flushed pink	June- Nov.	semi-evergreen in South
6	<i>Abelia</i> 'Edward Goucher'	4-5	lavender- pink	July- Oct.	semi-evergreen in South
7?	<i>Abelia schumannii</i> Schumann abelia	4-5	rosy pink	June- Aug.	
4	<i>Aesculus parviflora</i> bottlebrush buckeye	10-12	white	July- Aug.	large spreading shrub; var. <i>serotina</i> flowers later
5-6	* <i>Ardisia japonica</i> Japanese ardisia	1½	white	Aug.- Sept.	glossy foliage, per- sistent red fruit
5	<i>Artemisia abrotanum</i> southernwood	3-4	yellow	Aug.- Oct.	aromatic foliage
5	<i>Artemisia absinthium</i> wormwood	3-4	yellow	July- Oct.	aromatic foliage
2	<i>Artemisia frigida</i> fringed wormwood	1-1½	yellow	Aug.- Sept.	aromatic foliage
2	<i>Artemisia stelleriana</i> beach wormwood	2-2½	yellow	July- Aug.	finely cut foliage
4	<i>Baccharis halimifolia</i> groundsel-bush	7-8	yellowish- white	Aug.- Sept.	showy thistle-like fruits
5	* <i>Bruckenthalia spiculifolia</i> spike-heath	8-10in.	pink	June-	fine for rock garden
5-6	<i>Buddleia davidii</i> orange-eye buddleia	8-10	lilac	July- Sept.	
5-6	<i>Buddleia</i> , many hort. var.	6-10	white, pink, purple, red	July- Sept.	
5	<i>Buddleia nanhoensis</i>	3-4	mauve- purple	July- Sept.	
5-6	<i>Callicarpa bodinieri</i> Bodinier beauty-berry	5-6	lilac	July- Sept.	lilac-violet fruit
5-6	<i>Callicarpa dichotoma</i> purple beauty-berry	3-4	pink	Aug.	lilac-violet fruit
4	* <i>Calluna vulgaris</i> Scotch heather	1-1½	rosy-pink	July- Sept.	

Note: There are more than 100 horticultural varieties of heather with varying habits, flower color, time of bloom, etc. (See pages 54-56.)

Zone	Name	Height in ft.	Flower	Time of bloom	Special notes
5	<i>Campylotropis macrocarpa</i> Chinese clover-shrub	2-3	purple	Aug.- Sept.	
7	<i>Caryopteris incana</i> bluebeard	2-3	violet-blue	Sept.- Oct.	
2	<i>Caryopteris mongholica</i> Mongolian bluebeard	2-2½	blue	Aug.- Sept.	
Note: Some improved horticultural varieties such as <i>C. clandonensis</i> 'Blue Mist' and 'Dark Knight' have been developed.					
4	<i>Ceanothus americanus</i> New Jersey-tea	2-3	creamy-white	June- Sept.	
Note: Many garden hybrids with white, pink or blue flowers are available, but in general are not as hardy.					
5	<i>Chamaebatiaria millefolium</i> tansy-bush	3-4	white	July- Aug.	aromatic
5-6	<i>Clethra acuminata</i> cinnamon clethra	15-20	white, fragrant	July- Sept.	cinnamon bark
3	<i>Clethra alnifolia</i> summer-sweet	6-8	white, fragrant	July- Sept.	var. <i>rosea</i> is light pink
5-6	<i>Clethra barbinervis</i> Japanese clethra	15-20	white, fragrant	July- Aug.	
5-6	<i>Clethra tomentosa</i> woolly clethra	6-8	white, fragrant	Aug.- Sept.	
5	<i>Colutea arborescens</i> bladder-senna	8-9	bright yellow	June- July	
5	<i>Colutea orientalis</i> oriental bladder-senna	3-4	reddish- brown	June- Sept.	pale glaucous foliage
5	<i>Coronilla emerus</i> scorpion-senna	6-8	yellow	May- Oct.	
5	<i>Cotinus coggygria</i> smoke-tree	10-12	yellowish	June- July	more important for plumose fruiting panicles Aug.-Sept.

Note: Some new horticultural varieties such as 'Royal Purple' have showy reddish-purple foliage. The similar but taller *Cotinus americanus* is grown chiefly for its brilliant scarlet and orange fall color.

Hardy silk-tree (*Albizia julibrissin rosea*)
carries pink powderpuff-like flowers.

Taloumis



Where space is available, the low-growing, wide-spreading bottlebrush buckeye (*Aesculus parviflora*) is a worthy ornamental. It does not start to flower until late July.

Taloumis



Summer-Flowering Shrubs, continued

Zone	Name	Height in ft.	Flower	Time of bloom	Special notes
5	<i>Cytisus nigricans</i> spike broom	4-5	yellow	July- Aug.	var. <i>elongatus</i> blooms again in fall
5-6	<i>Cytisus praccor</i> Warminster broom	4-5	creamy-white	June- July	very showy
5	<i>Cytisus supinus</i> big-flower broom	2-3	yellow	June- Aug.	sometimes almost prostrate
7?	<i>Desmodium tiliacifolium</i> linden-leaf tick-clover	3-4	lilac to dark pink	Aug.- Oct.	
3	<i>Dicrvillea lonicera</i> dwarf bush-honeysuckle	2-2½	yellow	June- July	
5	<i>Dicrvillea rivularis</i> Georgia bush-honeysuckle	4-5	lemon- yellow	July- Aug.	
4	<i>Dicrvillea sessilifolia</i> southern bush-honeysuckle	3-4	sulphur- yellow	June- Aug.	
4	<i>Elsholtzia stauntoni</i> Staunton elsholtzia	3-4	lilac-purple	Sept.- Oct.	aromatic foliage
5	* <i>Erica cinerea</i> twisted heath	1-1½	rosy-purple	June- Sept.	
3	* <i>Erica tetralix</i> crossleaf heath	1-1½	rosy-pink	June- Sept.	
5	* <i>Erica vagans</i> Cornish heath	1-1½	pinkish- purple	July- Oct.	
Note: Horticultural varieties of heath have been developed with white, pink, purple and red flowers.					
5-6	<i>Fallugia paradoxa</i>	3-4	white	June- Aug.	feathery fruit heads
2	<i>Genista tinctoria</i> woadwaxen (dyer's greenweed)	2-4	yellow	June- Aug.	stands poor soil
2	<i>Halimodendron halodendron</i> Siberian salt-tree	4-5	purple or pink	June- July	
4	<i>Hamamelis virginiana</i> witch-hazel	10-12	yellow	Sept.- Oct.	
5	<i>Holodiscus discolor</i> rock-spirea	8-10	creamy- white in large panicles	July	arching branches
4	<i>Hydrangea bretschneideri</i> shaggy hydrangea	6-7	white, changing to purplish	July	broad, round bush
5-6	<i>Hydrangea macrophylla</i> bigleaf hydrangea	6-8	blue or pink rarely white	June- July	very variable
Note: Known in the nursery trade as <i>H. hortensis</i> , there are dozens of horticultural varieties of varying hardiness, stature, habit and flower color. Soil acidity affects the color.					
4	<i>Hydrangea paniculata</i> panicle hydrangea	20-25	white, changing to purplish, in panicles	Aug.- Sept.	frequently tree-like when trained to a single stem.
4	<i>Hydrangea paniculata</i> <i>grandiflora</i> peegee hydrangea	15-20	white to pink to purple	Aug.- Sept.	
Note: There are many other <i>Hydrangea</i> species and varieties which are mostly June flowering, although many last into July.					

Zone	Name	Height in ft.	Flower	Time of bloom	Special notes
5-6	* <i>Hypericum colycinum</i> Aaron's-beard (rose-of-Sharon)	9-12 in.	bright yellow	July- Sept.	deciduous in North; good groundcover
5	<i>Hypericum densiflorum</i> St. Johnswort	4-5	yellow	July- Sept.	
5	<i>Hypericum frondosum</i> (<i>H. aurum</i>) golden St. Johnswort	2-3	bright yellow	July- Aug.	dense shrub
5	<i>Hypericum 'Hidecote'</i>	2	golden- yellow	July- Aug.	one of the best
7	* <i>Hypericum hookerianum</i> Hooker's St. Johnswort	4-5	yellow	Aug.	half-evergreen in North
4	<i>Hypericum kalmianum</i> Kalm's St. Johnswort	2-3	bright yellow	Aug.	very hardy
7	* <i>Hypericum patulum</i> goldencup St. Johnswort	2-3	golden- yellow	July- Sept.	deciduous in North free flowering
6	<i>Hypericum patulum henryi</i> Henry's St. Johnswort	3	yellow	July	half-evergreen in South
4	<i>Hypericum prolificum</i> shrubby St. Johnswort	2-3	bright yellow	July- Sept.	vigorous
5	<i>Indigofera amblyantha</i> pink indigo	4-5	pale lilac- purple	Aug.- Oct.	
6-7	<i>Indigofera gerardiana</i> Himalayan indigo	2-3	rosy-purple	July- Sept.	
5-6	<i>Indigofera incarnata alba</i> white Chinese indigo	1-1½	white	July- Aug.	
Note: Indigoferas are frequently killed back in winter but flower profusely on current year's growth.					
5	<i>Itea virginica</i> Virginia sweetspire	2-3	white, fragrant	June- July	bright red fall color
4	<i>Lespedeza bicolor</i> shrub lespedeza	5-6	rosy-purple	Aug.- Sept.	
5	<i>Lespedeza maximowiczii</i> Maximowicz lespedeza	8-9	purple	July- Sept.	
5-6	<i>Lespedeza thunbergii</i> Thunberg's lespedeza	4-5	rosy-purple	Sept.- Oct.	



Talouis

Hydrangea 'Hills-of-Snow' bears masses of sterile all-white flowers.



Taloumis

The silvery appearance of the Russian-olive (*Elaeagnus angustifolia*) contrasts well with foliage of deeper green. It may be either a shrub or a small tree.

Japanese dogwood (*Cornus kousa*) blooms a month later than the well-known *Cornus florida*. Its white bracts are pointed at their tips.

Taloumis



Summer-Flowering Shrubs, continued

Zone	Name	Height in ft.	Flower	Time of bloom	Special notes
5	<i>Oplopanax horridus</i> American devil's-club <i>Philadelphus</i> : A genus with many species and horticultural varieties, mostly June mockorange flowering but some in July, with white flowers, often fragrant.	8-10	greenish- white	July- Aug.	showy scarlet fruit
2	<i>Potentilla fruticosa</i> bush cinquefoil	3-4	bright yellow	May- Aug.	
<i>Note</i> : There are many horticultural varieties of varying stature, mostly yellow, a few white.					
	<i>Rhododendron</i> rhododendron and azalea	Most members of this complex and prolific genus flower in spring. Among those having flowers in July or later are <i>R.</i> <i>arborescens</i> , <i>R. bakcri</i> , <i>R. discolor</i> , <i>R. maximum</i> , <i>R. minus</i> , <i>R. prunifolium</i> , <i>R. serrulatum</i> and <i>R. viscosum</i> , also a few horticultural varieties.			
	<i>Rhus</i>	Several species and varieties of <i>Rhus</i> flower in July and August, but the white sumac or greenish flowers are not showy and they are mostly grown for the brilliant red or purple fall color and the showy red to scarlet fruits.			
3	<i>Rubus odoratus</i> fragrant thimbleberry	6-7	purple, fragrant	July	
5	* <i>Ruta graveolens</i> common rue	2-3	dull yellow	June- Sept.	fragrant foliage
6	<i>Sorbaria aitchisonii</i> Kashmir false-spirea	6-7	white	July- Aug.	
5	<i>Sorbaria arborca</i> tree false-spirea	14-16	white	July- Aug.	
<i>Note</i> : Several other species of lesser value are sometimes planted.					
<i>Spiraea</i> : Most <i>Spiraea</i> species flower in spring. The following are among those flowering spirea in July: <i>S. albiflora</i> , <i>S. canescens</i> , <i>S. douglasii</i> , <i>S. salicifolia</i> , <i>S.</i> <i>tomentosa</i> (July-Sept.)					
5	<i>Symphoricarpos chenaultii</i> Chenault coralberry	3	pink	July	small red berries
2	<i>Symphoricarpos orbiculatus</i> Indian-current (coralberry)	3-5	yellowish, white	July	fruit purplish-red
7?	<i>Tamarix chinensis</i> Chinese tamarisk	10-12	pink	July- Sept.	
4	<i>Tamarix odessana</i> Odessa tamarisk	4-5	pink	July- Sept.	
2	<i>Tamarix pentandra</i> five-stamen tamarisk	10-12	rosy-pink	Aug. Sept.	
5	<i>Teucrium chamaedrys</i> germander	8-10 in.	purple or rose	July- Sept.	for rock garden or low border
5	<i>Teucrium montanum</i> mountain germander	10-12 in.	yellow	July- Aug.	
5	<i>Triptaleia paniculata</i>	5-6	white pink-tinged	Aug.	rare and interesting
4	<i>Tripterygium regelii</i> Regel's three-wing-nut	4-5	yellowish- white	Aug.- Sept.	will also climb into trees
6-7	<i>Vitex agnus-castus</i> lilac chaste-tree	7-9	fragrant, lilac or violet	July- Sept.	variety <i>latifolia</i> is larger and hardier.
5-6	<i>Vitex negundo incisa</i> cutleaf chaste-tree	10-12	lilac or lavender	July- Aug.	finely cut aromatic foliage



GARDENING IN CONTAINERS FOR CONTINUOUS COLOR

George Taloumis

THERE is no limit to what the home gardener can do in the way of outdoor gardening in containers. No longer is it confined to the growing of plants in ordinary clay pots and window-boxes. Rather, it has expanded to include boxes of all shapes and sizes, made of a variety of materials, also planters, tubs, hanging baskets, and even curiosity types of con-

tainers, such as strawberry jars, donkey carts, jugs, crocks, and old-fashioned black kettles. Even business places are adopting this style of ornamentation for their buildings. At home or office it is the quickest and easiest way to introduce color immediately wherever it is wanted. When the currently blooming plants fade, others can be brought in to sustain the color parade.

The container garden offers several other advantages. Pots and small containers can be moved about for a change of scenery. The patio or garden can be given a wholly new effect. In bad weather, plants can be easily moved indoors, and early frosts can be evaded this way. Furthermore, each kind of plant can be given its particular needs—sweet or acid soil, full sun or shade, small or great amounts of water, heavy or light feeding.

No area is too small for a few container plants. Not even garden space is needed, only a porch, city balcony, rooftop, windowsill, walk, wall, fence, or a tiny paved area. Hanging baskets can be suspended from various places.

Changeability of plant material is another point in favor. Pansies, English daisies and forget-me-nots of spring can give way to geraniums, marigolds, petunias, verbenas, zinnias, balsam, lobelia, ageratum, cockscomb, salvia, annual phlox, salpiglossis and stock. These in turn can make way for chrysanthemums, which bloom for several weeks in autumn.

If bulbs are used in spring (hyacinths, daffodils, tulips and others), they are not planted directly in containers in cold climates, but trays and pots of bulbs are placed in the containers just as the plants are coming into flower.

The container garden can actually be started any time. The first step is to



Taloumis

Growing here in miscellaneous containers are Japanese red maple, yellow calla and the low rosettes of houseleeks.



Merry Gardens

Fuchsias (above) are ideal for outdoor culture in containers of all sorts in the summer. Redwood tubs (below) hold geraniums; petunias and variegated vinca grow in window-boxes.



decide on the kinds of containers. Then select the plants. Consider a group of red geraniums in a white tub by an entrance, blue ageratum and yellow dwarf French marigolds in clay bulb pans, a purple lantana in a hanging basket for the wall or fence that adjoins the terrace, or lush fuchsias in the window-boxes on the north side of the house or in the shade of trees.

In their limited growing quarters, plants require rich soil. For most plants, a mixture of two parts good garden soil, one part sand, and one part peatmoss or leafmold is suitable, with a balanced fertilizer added according to directions, plus a heavy sprinkling of superphosphate. Broken pieces of clay pots or pebbles are needed over the drainage holes for water to pass through freely.

Regular watering is an essential of success for plants in containers. In very hot weather some plants may require water twice a day, particularly those in porous clay pots. Window-boxes and other containers close to buildings do not



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Canterbury bells show off to excellent advantage when grown in a white tub.



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Small barrel cacti are nestled here in a low dish surrounded by the foliage of alternanthera.

benefit from rain, so they need water more frequently. A layer of peatmoss or pebbles on the surface of the soil will aid in keeping it moist longer.

Feeding will be required several times during the growing summer season. Geraniums, annuals and other flowers are placed so closely, as they need to be for good effect, that they soon use up the available nutrients. Every two weeks is a good schedule for the feeding of fast-growing flowering plants that are packed tightly. Fertilizer can be applied in dry or liquid form as long as directions are followed and the soil is moist in order to prevent burning.

To avoid unsightly appearance, faded flowers and yellow leaves should be kept continuously removed. A dust pan and broom should be kept handy for this purpose. Some plants will need pinching to keep them bushy, among them petunias, coleus and fuchsias. Do the same with hanging plants, like variegated vinca and English and German ivies, which otherwise become too lanky.

On other plants, prune leggy growth. Some will need staking. Turn small containers around periodically to prevent one-sided growth, and spray with an all-purpose insecticide if aphids, Japanese beetles, earwigs, or other pests show up.

If a particular plant is not doing well,

move it to another location. If too far gone to revive, toss it out or place it in an out-of-the-way corner to be nursed back to health.

Stock, nemesia, annual phlox and violas do not like hot, sizzling weather, but they can be grown early in the season before the heat comes and then be discarded. Parsley, rosemary, basil and other herbs, though not essentially flowering plants, have charm and usefulness at the back steps and can be colorful if planted in painted tubs.

There is a spirit of adventure in pot gardening that calls for the growing of the unfamiliar, even the difficult. Such customary standbys as geraniums, pansies, petunias and chrysanthemums may be reliable old favorites, but to grow the rare and unusual gives the gardener a lift. Among the less common plants worth trying are these more or less tender ones:

calla-lily (*Zantedeschia aethiopica*), rhizomatous plant from South Africa, 2½ feet high.

gladiolus of many varieties, grown from corms.

tiger-flower (*Tigridia pavonia*), corm from Mexico and Guatemala, treated like gladiolus, 1½-2½ feet.

montbretia (*Tritonia crocata*), corm from South Africa bearing spikes of colorful flowers.

canna (*Canna generalis*), large background plant.

Kafir-lily (*Clivia miniata*), fleshy roots, heavy strap-shaped leaves, scarlet flowers in an umbel; South Africa.

lantana (*Lantana camara*), shrub from tropical and subtropical America; verbena-like flowers of yellow or orange to scarlet in small flat-topped heads.

glory-bush (*Tibouchina semidecandra*), shrub 4-10 feet high, flowers violet to reddish-purple, 3-5 inches across; stamens purple, unequal in length.

crown-of-thorns (*Euphorbia milii*; *E. splendens*), Madagascar; somewhat climbing spiny shrub; red flowers all year, but mostly winter.

croton (*Codiaeum variegatum*), shrub to 6 feet or more from South Seas; grown for colorful leaves.

tuberose (*Polianthes tuberosa*), rootstock a tuber; flowers small, white, fragrant, lily-

like, in 2-3½-foot spikes; leaves grass-like. **Chinese hibiscus** (*Hibiscus rosa-sinensis*), large shrub, common in tropical countries; flowers rose-red.

allamanda (*Allamanda cathartica*), tall climber from Brazil; flowers golden-yellow, 2-3 inches across, white in throat.

Confederate-jasmine (*Trachelospermum jasminoides*), evergreen climber from China; white flowers to 1 inch across, fragrant.

oleander (*Nerium oleander*), evergreen shrub from Mediterranean region; flowers white (to red or purple) 1½-3 inches across.

blue lily-of-the-Nile (*Agapanthus africanus*), root cord-like, leaves strap-shaped, flowers numerous in a great blue globe.

If there is the problem of color in the shade, fuchsia, impatiens, flowering tobacco, tuberous and wax begonias, browallia, torenia, and black-eyed-Susan-vine are some of the flowering kinds to be recommended. Brilliant effects can also be achieved with the foliage of coleus and fancy-leaved caladiums. ♦



Taloumis

Among the container-grown plants shown here are climbing nasturtiums, pinks, rosemary, basil, geraniums, Canterbury bells and heliotrope.

CLIMBERS CAN BE COLORFUL OVER A LONG SEASON

Flowers, fruits and foliage contribute to the scene

Helene Flegg

IN even the smallest garden there is no lack of space upward; it is limited only by the gardener's ingenuity in supplying supports. Walls, trellises, posts, arbors and fences can be made beautiful and colorful all summer and into winter with a well chosen selection of flowering and fruiting vines. And there is an advantage in being able to see flowers at eye level or delight in their fragrance at nose level.

Culturally, vines demand little more than any other plant. While some must be encouraged by tying, most will cling or twine on any available support. The usual good garden practices of pruning, spraying and feeding will keep them thriving and flowering.

Some Old Reliables

In late spring many an arbor will drip with wisteria's lavender trusses. Though this is not a reliable bloomer except on a well-sheltered wall, hard pruning does much to encourage yearly flowering. This is a large climber not suitable for restricted areas.

Honeysuckles (*Lonicera*) take several years to come to full beauty. A good choice is *L. japonica* var. *halliana*, which has white blossoms to fading yellow. 'Goldflame' has red buds opening to flame-pink trumpets with yellow throats and a most persuasive perfume. From the first flush of color in June there are almost always a few flower clusters to brighten the fresh green foliage.

Japanese bindweed (*Convolvulus japonicus*), otherwise known as California-rose, is best confined to a sunken tub or pail to curb its wandering tendencies. It can be depended upon to display a suc-

cession of double pink blooms from June to September.

Clematis, too, will give of its best in June, with some scattering of flowers until frost. The large-flowered hybrids are the showiest but the nodding yellow bells of *C. tangutica* or the billowy blue masses of the hybrid 'Mrs. Robert Bryden' in August are equally beautiful. My favorite is *C. texensis* with its coral-red urns and burnished seed heads. Most clematis vines seem to be happier when grown with other plants, and some delightfully unexpected surprises occur; this year it was the blue saucers of *Clematis* 'Ramona' suddenly appearing on the honeysuckle!

Climbing roses in late June and July are a mass of color, and most of the newer varieties will bloom lightly until autumn. There are miniature climbers, too, that are charming trained on a wall by a patio where they can be seen at leisure.

The problem of a shaded wall is easily solved with *Hydrangea petiolaris*. This climbing shrub will cling firmly to masonry walls and in June is covered with large white flower heads. A little slow to start, it will ultimately cover a large area. *Schizophragma hydrangeoides*, the **Japanese hydrangea-vine**, is a smaller version that makes a better choice if the wall is restricted in size.

For large areas in full sun the **trumpet-vine** (*Campsis radicans*) with clusters of 3-inch orange-red trumpets from July to September will give the added dividend of bringing the hummingbirds. The hybrid 'Mme. Galen' with salmon-red flowers is not nearly as large and needs a sheltered spot.

Another exuberant climber needing plenty of room is *Polygonum aubertii*,



Taloumis

A hybrid clematis climbs to the top of a slatted shelter. This woody vine supports itself by its clasping petioles.

aply called the **silver-lace vine**. In late summer it is covered with clouds of greenish-white flowers.

September brings the bright fruits of **bittersweet** (*Celastrus scandens*). This strong grower needs a firm hand to keep it in bounds, but the task is a pleasure because the berried branches are well loved for indoor decoration. Though the

berries are smaller on the Chinese bitter-sweet (*C. loeseneri*), there will be quantities more of them and it is a dependable yearly show.

The scarlet berries and almost evergreen foliage of **firethorn** (*Pyracantha coccinea*) carry summer color into autumn and winter. In the North a sheltered warm wall is necessary for success.



John Flegg

Passion-flower (*Passiflora alato-caerulea*) as it grows in the author's garden

Annual and Tender Climbers

The choice of annual and tender vines is equally wide. Though they come into flower a little later than the hardy perennial kinds, most are generous with a succession of color until frost. The **cup-and-saucer vine** (*Cobaea scandens*) will flower from mid-June until frost from seed sown indoors in February. The white form, *C. scandens alba*, has special charm.

Familiar to all are the **morning-glories** (*Ipomoea*). Easily grown and generous with bloom, they have earned their place in our gardens. Seeds of the annual kinds should be notched and sown where they are to flower only after the soil is warm. One seldom seen north is *I. leari*, the blue dawn-flower, which from July till frost greets the morn with a glorious



Sheridan Nurseries, Toronto

Dense clusters of red berries are the great attraction of firethorn (*Pyracantha*).

display of gentian-blue trumpets in large clusters. This plant must be carried over winter indoors and planted out as rooted cuttings. *Ipomoeas* are sun-lovers.

The **passion-flowers** (*Passiflora*), though common in the tropics, are sure to arouse curiosity when grown outdoors in the North. Easily propagated from cuttings and set out as small plants from 4-inch pots, they will cover quite an area before frost. The hybrid *P. alato-caerulea* is the easiest; even a small plant will produce a daily succession of flowers up to 4 inches across with white sepals, pink petals and a deep blue crown.

To tickle the palate of both the hummingbirds and the gardener, *Phaseolus coccineus*, the scarlet-runner bean, can be grown. The profusion of red flowers

creates an irresistible attraction, and the pods harvested while small are better than any vegetable in the supermarket.

Not often are the tropical American vines *Eccremocarpus scaber*, *Maurandia barclaiana* or *Quamoclit pennata* found in contemporary gardens, though all are quietly elegant climbers with delicate foliage and interesting flowers. *Eccremocarpus*, of the bignonia family, has clusters of orange-red. *Quamoclit*, the cypress-vine, a morning-glory relative, carries bright red stars. *Maurandia*, related to snapdragon, has purple or blue trumpets.

M. crubescens has coarser foliage and 3-inch deep-pink flowers.

For a constant show all summer any lanky geranium (*Pelargonium*) can be trained by tying up with strings during the winter. When planted out it will branch all over and flower on every break. The astonished cry of "a climbing geranium!" from every visitor is worth the small effort to produce this effect. The plants can be held over for several years by lifting before frost and cutting back in the same manner as handling standard geraniums.



Sheridan Nurseries, Toronto

While hydrangea plants are generally shrubs, *H. petiolaris* is a handsome climber. It clings by rootlets sent out from the woody stem and branches, but it also needs support. The white flower clusters are up to 10 inches across.



PLANTS FOR SHADY GARDENS

Daniel J. Foley

MOST flowering plants require sun for at least half a day to produce sturdy growth as well as satisfactory bloom. However, there are a surprising number that are either true denizens of shade or adaptable to it, some tolerating considerably less direct and reflected light than others. Shade created by buildings, walls, and fences presents a problem of less than normal sunlight and daylight, and little can be done to change the situation. Because it is elusive, shade cannot be measured with any degree of precision. Consequently, trees, shrubs, perennials, bulbs, and annuals to be planted under this condition must be selected with more than average care, since not all kinds bloom or grow well in limited light.

On the other hand the variety of plant material under trees may be increased, since light conditions can be altered by pruning and thinning the tops to allow filtered sunlight to enter. Often, the removal of a few branches makes the difference, even on such dense trees as maples.

In spring, before the leaves appear, color beneath trees can be provided by drifts of bloodroot, foam-flower, trillium, blue phlox, and other native wildlings. Flowering bulbs such as scillas, crocuses, species tulips, daffodils, glory-of-the-

snow, and many others are easily established in such a place, since they seldom need to be disturbed, once planted. Hardy perennials like bleeding-heart, foxgloves, false-spirea, sweet-rocket, peach-bells, snakeroot and bee-balm, make for continuity of bloom.

For summer and autumn there are innumerable varieties of daylilies, plantain-lilies, hardy ageratum and other hardy plants. Such colorful annuals, as patient Lucy (*Impatiens*) in red, salmon, pink or white, and flowering tobacco (*Nicotiana*) with fragrant white, pinkish, purple or chartreuse flowers contribute their share of color. Begonias in variety (particularly the tuberous kinds), coleuses and fuchsias, all tender plants, make shady gardens a source of sheer delight from late spring to frost, filling the color needs for summer admirably.

Success in the shady garden is based largely on careful plant selection, placement, sufficient moisture, staking, pinching, and feeding. Encroaching roots of shrubs and trees offer continual competition with their greediness for moisture and plant food, so that frequent watering and feeding with complete fertilizers, either dry or liquid are vital. Overshadowing branches on trees and shrubs need constant heading back during the grow-

The many hues and patterns in the leaves of coleus bring color to the shaded garden. Ferns and hostas accompany them here, with viburnum as a background.

Taloumis





Taloumis

Included in this border planting are yellow calla, *Impatiens* and wax begonias.



Taloumis

Plantain-lilies (*Hosta*) surround this large and decorative crinkled-leaved begonia. Both will thrive in moderate shade.

ing season to provide all the light possible.

In preparing beds and borders, root pruning of trees and shrubs is often necessary. Little or no harm results. But no attempt should be made to dig close to rhododendron, mountain-laurel or other broad-leaved evergreens, though careful root pruning may be required every two years. The alternate approach is to sink

plants in 6-inch pots up to the rim and mulch them heavily. This practice has proved especially satisfactory with tender plants, such as tuberous-rooted begonias and fuchsias.

Gardening in the shade usually involves more effort than growing plants in full sun, but it has its compensations. The presence of shade itself, especially in the hot days of summer, is one of them. ♦

ANNUALS FOR THE SHADE

balsam	<i>Impatiens balsamina</i>	8-24"	flowering tobacco	<i>Nicotiana affinis</i>	1-2½'
begonia	<i>Begonia semperflorens</i>	12-15"	forget-me-not	<i>Myosotis</i>	
blue salvia	<i>Salvia farinacea</i>	2-3'	fuchsia	<i>Fuchsia species</i>	1-3'
browallia	<i>Browallia speciosa major</i>	15"	Madagascar periwinkle	<i>Vinca rosea</i>	10-18"
coleus	<i>Coleus blumei</i>	2'	patient Lucy	<i>Impatiens sultanii</i>	6-24"
feverfew	<i>Matricaria</i>	8"-2'	lobelia	<i>Lobelia erinus</i>	4-6"
			wishbone flower	<i>Torenia fournieri</i>	12"

SELECTED LIST OF PERENNIALS

Common name	Botanical name	Height	Degree of shade	Flowering period
balloon-flower	<i>Platycodon grandiflorum</i>	1½-2'	LS-SS	June-July
bee-balm	<i>Monarda species</i>	2-3'	LS-SS	June-Aug.
bellflower, peachleaf	<i>Campanula persicifolia</i>	1½-3'	LS-SS	June-July
bleeding-heart	<i>Dicentra spectabilis</i>	1½-2'	LS-SS	April-June
bloodroot	<i>Sanguinaria canadensis</i>	6-10"	SS-DS	April-May
blue phlox	<i>Phlox divaricata</i>	15"	LS-SS	May-June
cardinal-flower	<i>Lobelia cardinalis</i>	3'	LS-SS	July-Aug.
Christmas-rose	<i>Helleborus niger</i>	1'	LS-SS	Nov.-April
chrysanthemum	<i>Chrysanthemum species</i>	1-3'	LS	Sept.-Nov.
columbine	<i>Aquilegia species</i>	1-3'	LS	May-July

coral-bells	<i>Heuchera sanguinea</i>	1½'-2'	LS	May-Sept.
dame's-violet	<i>Hesperis matronalis</i>	2-3'	LS-SS	June-Sept.
daylily	<i>Heemerocallis</i> species	2-5'	LS-SS	May-Sept.
dwarf anchusa	<i>Brunnera macrophylla</i>	15"	LS-SS	May-June
evening-primrose	<i>Oenothera tetragona</i>	18-24"	LS	June-Aug.
false-spirea	<i>Astilbe</i> species	1½'-4'	LS-SS	June-July
forget-me-not	<i>Myosotis</i> species	8"	LS-SS	April-July
foxglove	<i>Digitalis</i> species	4'	LS-SS	June-July
fringed bleeding-heart	<i>Dicentra eximia</i>	15"	LS-DS	May-Sept.
gas-plant	<i>Dictamnus albus</i>	3'	LS	June-July
globe-flower	<i>Trollius</i> species	1-2'	LS	May-July
hardy candytuft	<i>Iberis sempervirens</i>	1'	LS	May-June
iris	<i>Iris</i> species	6"-3'	LS	April-July
Jacob's ladder	<i>Polemonium caeruleum</i>	1'	LS-SS	May-June
leopard's-bane	<i>Doronicum</i> species	1-2'	LS-SS	April-May
Michaelmas daisies	<i>Aster</i> species	1-4'	LS	Sept.-Oct.
monkshood	<i>Aconitum</i> species	3-5'	LS-SS	July-Oct.
phlox	<i>Phlox paniculata</i>	2-3'	LS	June-Oct.
primrose	<i>Primula</i> species	6-18"	LS-SS	April-June
Shasta daisy	<i>Chrysanthemum maximum</i>	18"	LS	June-Oct.
snakeroot	<i>Cimicifuga</i> species	4-6'	LS-DS	July-Aug.
speedwell	<i>Veronica</i> species	1-2'	LS-SS	June-Sept.
violets	<i>Viola</i> species	8"	LS-SS	April-Aug.
Virginia bluebells	<i>Mertensia virginica</i>	18"	LS-DS	April-May
wake-robin	<i>Trillium</i> species	12"	LS-DS	May
windflower	<i>Anemone</i> species	2-4"	LS	Sept.-Oct.

* Code: LS—light shade; SS—semi-shade; DS—deep shade.

FLOWERING GROUNDCOVERS FOR SHADE

barrenwort (<i>Epimedium</i>)	Hall's honeysuckle (<i>Lonicera japonica halliana</i>)
bloodroot (<i>Sanguinaria canadensis</i>)	
blue phlox (<i>Phlox divaricata</i>)	lily-of-the-valley (<i>Convallaria majalis</i>)
coral-bells (<i>Heuchera sanguinea</i>)	periwinkle (<i>Vinca</i>)
foam-flower (<i>Tiarella cordifolia</i>)	plantain-lilies (<i>Hosta</i>)
fringed bleeding-heart (<i>Dicentra eximia</i>)	speedwell (<i>Veronica</i>)
	violets (<i>Viola</i>)

FLOWERING SHRUBS AND TREES FOR SHADE

azalea (<i>Rhododendron</i>)	privet (<i>Ligustrum</i>)
barberry (<i>Berberis</i>)	redbud (<i>Cercis canadensis</i>)
blueberry (<i>Vaccinium</i>)	St. Johnswort (<i>Hypericum</i>)
cotoneaster (<i>Cotoneaster</i>)	sourwood (<i>Oxydendrum arboreum</i>)
enkianthus (<i>Enkianthus</i>)	summersweet (<i>Clethra</i>)
firethorn (<i>Pyracantha</i>)	viburnum (<i>Viburnum</i> , except <i>V. burkwoodii</i> , <i>V. carlesii</i> , <i>V. carlcephalum</i>)
flowering dogwood (<i>Cornus florida</i>)	winged euonymus (<i>Euonymus alatus</i>)
honeysuckle (<i>Lonicera</i>)	
hydrangea (<i>Hydrangea</i>)	

BROAD-LEAVED EVERGREENS FOR SHADE

andromeda (<i>Pieris</i>)	mountain-laurel (<i>Kalmia latifolia</i>)
boxwood (<i>Buxus</i>)	Oregon holly-grape (<i>Mahonia nervosa</i>)
English ivy (<i>Hedera helix</i>)	pachysandra (<i>Pachysandra</i>)
holly, English (<i>Ilex aquifolium</i>)	periwinkle (<i>Vinca</i>)
Japanese (<i>Ilex crenata</i>)	skimmia (<i>Skimmia</i>)
inkberry (<i>Ilex glabra</i>)	rhododendron (<i>Rhododendron</i>)
leucothoe (<i>Leucothoe</i>)	wintercreeper (<i>Euonymus</i>)

PLANTS IN HANGING CONTAINERS

For versatility and bloom

Winnie Davis Crane

WHEN a plant is suspended in the air it becomes quite different from its ground-oriented relative. Through Newton's law of gravity and the plant's intricate chemistry, naturally erect branches turn downward and surprising laterals curve upward.

Many plants are trailers and many others have the tendency to spread or droop. All can be grown in hanging containers. Stubborn upright plants, including some shrubs, can be coerced to hang by judicious pruning, wilting and weighting. (To wilt, withhold water until the branches droop, attach a weight with

soft twine, rejuvenate, and the plant will conform thereafter.)

The hanging plant has an advantage over its relative planted in the ground. It can be moved, at will, from place to place, depending on its requirements for sun or shade.

For continuous summer bloom, the plants that can be grown hanging from containers are legion. The following are among the best:

Begonia—tuberous and fibrous-rooted. All the shades of the rainbow except blue. Partial shade but plenty of light.

Shrimp-plant (*Beloperone guttata*) is



Eugene Mitchell

Flowering plants of many kinds and colors hanging in a lath shelter at Mrs. Crane's Sugar Hill Nursery in Dalton, Massachusetts



Genereux

'Golden Marinka' is the name of this fuchsia, grown by Mrs. Crane.

Taloumis

Fuchsias are among the finest plants to grow in hanging baskets.

very showy in a hanging pot. Apricot or yellow bracts in spikes carry the white flowers at their tips. Sun.

Bougainvillea. Many new varieties in apricot, gold, cerise, crimson, even white. Likes full sun.

Amethyst-flower (*Browallia speciosa major*). Bears profuse violet-blue blooms against glossy green foliage. Sun and filtered shade.

Bellflower (*Campanula fragilis* and *C. isophylla*). Star-shaped flowers in shades of blue and white. Full sun.

Morning-glory (*Convolvulus mauritanicum* and *C. cneorum*). Bushy, spreading trailers. They require sun and are lavish bloomers.

Fuchsia. There are many hanging varieties, both single and double, and all are beautiful. For quick effect set small plants in a 10-inch pot and pinch back.

Garden balsam (*Impatiens*). Shade. New doubles in maroon, rose and pink should be more widely grown.

Lantana (*L. montevidensis*). Lavender flowers. Full sun.

Lobelia. 'Sapphire' and 'Blue Cascade' are natural trailers. Their white-eyed blue blossoms foam over sides of containers. Sun.

Nierembergia (*N. caerulea*). Covers itself with lavender-blue and white blooms.

Ivy-leaved geranium (*Pelargonium peltatum*). 'Sunset Ivy' (L'Élégante) and 'M'me Margot' (Duke of Edinburgh), both with variegated foliage, make outstanding baskets. Ivy-leaved geraniums all lend themselves to constant color. The scented-leaved variety 'Clorinda' carries pink blooms as large as the hortorum geranium. All need full sun.

Petunia. The new Cascades are floriferous and stunning. Available in white, pink, salmon, red, and a good double mixture, all with enormous blooms. A well-grown basket is a sight to remember. Sun.

Leadwort (*Plumbago capensis*). With blooms resembling phlox in blue or white. It makes an arresting, shrubby basket. Sun.

Black-eyed-Susan-vine or clock-vine (*Thunbergia alata*). A trailer that comes



Taloumis

An ivy geranium covered with pink flowers offers a welcome at this door.

in tangerine, apricot, orange and white, with black centers. Easy to grow in sun.

Nasturtium (*Tropaeolum majus*). Has been hybridized for double blooms and brighter color. 'Cherry Rose' and 'Cherry Scarlet' carry their blossoms well away from the foliage. 'Hermione Grashof', extra double, is a brilliant orange. Full sun.

Containers and Maintenance

The containers that hanging plants can be grown in are also legion: wooden baskets, moss-lined wire baskets, plastic or clay pots, cypress knees, strawberry jars, iron kettles, wood burls, tree-fern logs, etc. Containers in any form or shape that will hold soil will challenge the imagination.

Once the planted container is equipped with bracket, wire or chain, it can be hung in the area of one's choice: from tree branches, porch eaves, lath, almost anywhere. Ingenuity brings rewards.

To maintain a hanging plant the following tips are important:

Watering. Wind and sun make plants in hanging containers dry out quickly.



Eugene Mitchell

Sedum morganianum is a reliable succulent plant for basket culture.

During the summer months watering twice daily may therefore be necessary. Watch the plant. When watering, do so thoroughly.

Fertilizing. During the growing season feed every ten days with a balanced fertilizer. Fish emulsion for begonias and fuchsias is beneficial.

Grooming and spraying. Keep the basket free of seed pods and dead flowers and foliage. Follow the same spray therapy as for plants in the ground.

Soil. Soil in containers exhausts itself after a time despite added nutrients and, despite thorough leaching, soluble salts build up. Renew the soil each year and pot on as needed. ♦



Taloumis

Sheltered from the sea's high winds, a border of annuals (with a few perennials) can be vigorous and colorful during the vacation season.

FLOWERING PLANTS FOR VACATION PROPERTIES

Seaside, mountain and woodland

George Taloumis and Daniel J. Foley

DURING the summer months, from late June until after Labor Day, many city and suburban dwellers find a change of pace at the seashore and in the mountains. There they pursue gardening, concentrating on the kinds of plants that come into flower in summer.

Although trees, shrubs and vines form the background and the basic design, hardy perennials, foolproof and reliable, are needed. Yet much of the color comes from annuals, which are purchased as sturdy seedling plants in flats. These are inexpensive, procurable at many sources, often along highways, and they come quickly into bloom. Many are already colorful when they are purchased or

brought from the permanent residence, where they were raised from seed.

Gardens near the seashore are generally sunny. Soil is light and sandy, and there is the problem of exposure to winds. In many instances, salt spray is also a challenge, but this usually assumes major proportions during fall and winter storms. Even so, trees and shrubs adapted to these conditions are obtainable.

Gardens in the mountains or in the woods are apt to be shady and cool, with openings that allow the sun to pass through. Soil is usually heavier, with a higher content of humus. Over-all temperatures are cooler, with lower readings at night.



Taloumis

Christmas ferns make ideal greenery in a shady woodland garden.



Taloumis

Rosa rugosa thrives near the sea, flowering prolifically during the summer.

In each case, plants need to be selected primarily for color and cut-flower value, as well as hardiness. Where hardiness is questionable, local nurseries, state agricultural centers and experienced garden-

ing neighbors can offer sound advice. Browsing in the immediate neighborhood will also be helpful. Here are some suitable plants for vacation properties.

Flowering Plants for Seaside Gardens

Shrubs and Vines

Abelia
Azaleas, late hybrids
Barberry, red-leaved
(for foliage color)
Blueberries
Butterfly-bush
Caryopteris
Clematis hybrids
Climbing roses
Firethorn
Floribunda roses
Heath
Heather
Honeysuckle, Japanese
Hypericum
Potentillas
Privet
Privet, yellow-leaved
(for foliage color)
Rose-of-Sharon
Spirea, Anthony Waterer
Swamp azalea
Sweetbay magnolia
Tamarix

Trumpet-creeper
Vitex

Annuals

Asters
Bachelor-buttons
Carnations
Cosmos
Drummond phlox
Dusty miller
(for gray foliage)
Gaillardia
Iceplant
Larkspur
Lobelia
Morning-glory
Marigold
Nasturtium
Nicotiana
Pansies
Petunia
Portulaca
Snapdragon
Strawflower
Sweet-alyssum
Verbena

Zinnia

Perennials

Balloon-flower
Bee-balm
Butterfly-weed
Cardinal-flower
Columbine
Coral-bells
Coreopsis
Daylily
Delphinium
Evening-primroses
Gaillardia
Globe-thistle
Hollyhocks
Lavender
Loosestrife
Peach-leaf bellflower
Phlox
Sedums
Shasta daisy
Sweet-William
Veronicas
Violas
Yucca

Groundcovers

(Though many are not essentially flowering plants, they are a vital part of the seaside garden)

Armeria
Artemisia
 'Silver Mound'
Beach pea
Beach wormwood
Bearberry
Brooms
Cerastium
Cotoneaster
Dusty miller

English ivy
 and its varieties
Heath
Heather
Houseleek
Japanese honeysuckle
Juniper
 (dwarf kinds)
Myrtle
Pachistima
Pachysandra
Pinks
Portulaca
Santolina
Sedum

Thyme
Verbena

Trees

Black locust
Golden-rain
Japanese maple
 (for red foliage)
Japanese tree lilac
Kousa dogwood
Russian-olive
 (for gray foliage)
Silk-tree
Sophora
Sourwood
Sweetbay magnolia

Flowering Plants for Mountain and Woodland Gardens

Annuals for Sun

Calendula
Cosmos
Dwarf dahlias
Feverfew
Marguerite
Petunia
Portulaca
Snapdragon
Sweet-alyssum
Verbena

Annuals for Shade

Balsam
Browallia
Cleome
Coleus
Fuchsia
Lobelia
Nicotiana
Patient Lucy
Tuberous begonias
Wax begonias

Perennials for Sun

Balloon-flower
Delphinium
Evening-primroses
Gloriosa daisies
Loosestrife
Peach-leaf bellflower
Peony

Phlox
Shasta daisy

Perennials for Shade

(All listed for shade are useful also in sun)

Astilbe
Bee-balm
Columbine
Coral-bells
Daylilies
Foxgloves (biennials)
Fringed bleeding-heart
Plantain-lilies
Veronicas

Shrubs and Vines

Butterfly-bush
Caryopteris
Chinese fleece-vine
Climbing roses
Floribunda and shrub roses
Heavenly-blue
 morning-glory
Hydrangeas, Snowhill,
 Peegee, and others
Jackman clematis
Japanese honeysuckle
Potentilla
Rose-of-Sharon
Spirea 'Anthony Waterer'

Summer-sweet
Trumpet-creeper
Vitex

Trees

Goldenrain
Kousa dogwood
Japanese tree lilac
Sourwood
Sweetbay magnolia

Groundcovers

(An important part of the woodsy vacation garden, even if not colorful)

Ajuga
Creeping Charlie
English ivy
Epimedium
Ferns
Foam-flower
Goutweed
Houseleeks
Japanese honeysuckle
Lily-of-the-valley
Myrtle
Pachysandra
Pinks
Roman wormwood
Sedums
Violets

ARRANGING SUMMER FLOWERS

Julia S. Berrall



Roche

The author's arrangement for a summer luncheon

“ARRANGING summer flowers” can mean grouping a bunch of glowing nasturtiums gathered from beside a gray stone wall, placing a few other perfect blossoms with some previously arranged foliage, or spending a sizable length of time in designing a large and varied bouquet. Its effectiveness will come from a sensitivity to combinations of color and texture, and to appropriate settings.

Starting with Foliage

The inexperienced may think it is working backwards to suggest that foliage material be selected first, but there is no better way to achieve good design in an arrangement. Here are some plants you can grow in your own garden to use in combination with summer flowers: An-

dromeda (*Pieris japonica*), aucuba (avoid the gold-sprinkled kind), Burford holly (*Ilex burfordii*), and mountain-laurel (*Kalmia latifolia*), all evergreen with shiny, smooth textures. Of these, *Aucuba japonica* is my favorite. It is unusual-appearing, has a certain elegance, and roots very easily. I frequently place a short stem or two in a small vase with roses. It can last the summer, sprout roots and be planted in the fall.

For large-leaved contrast to cut flowers, the perennial *Bergenia cordifolia* offers thick, shining, rippled leaves. Foliage of the blue hydrangea, which is pest-free and rich in color, can add style to a bouquet. For other bold foliage effects it is worth while to grow some of the many varied hostas or funkias. *Hosta sieboldiana* has large blue-gray leaves, *Hosta*



Roche

Blue delphiniums and hydrangeas combine with white lilies and daisies to make a cool-looking, informal bouquet.

subcordata grandiflora has shiny yellow-green leaves, and there are several varieties, large- and small-leaved, with handsome white markings. Other useful greens include the spears of iris, the dark tones of canna leaves and the stiff-needed branches of some of the pines and junipers.

Several plants are of great usefulness for gray-leaved interest. Naturally we think first of the artemisias, but there is also baptisia, which has a graceful delicacy in the garden as well as when added to a bouquet. There is also the plume-poppy (*Bocconia*), a tall and very distinctive plant.

Flowers to Match One's Rooms

In selecting seeds from catalogues, one should think first of the colors used in the rooms where one's arrangements will be placed. If there are subtle rose colorings in the living room, why grow dozens of bright orange marigolds? Even the color and pattern of dinnerware can dictate

what is best to bring in from the garden.

In summer's first days the Shasta daisies ask to be picked. Combine them with the varied blues of delphinium and heighten the interest by adding the intense blues of hydrangeas and you will have achieved a truly dramatic effect from ordinary flowers.

Because the floribundas and tea roses are so generous in repeating their bloom we must count them among the summer flowers. It is worth while to use varieties with a 'Peace' strain, for their leaves are healthy and of good substance. 'The Fairy', a polyantha rose with trusses of delicate pink flowers similar to the rambles, is also disease-resistant. Roses when used alone need their own special containers for they are aristocrats and require fine quality. Complement them with porcelain, crystal or fine earthenware but never with crude, inexpensive pottery.

Summertime Combinations

In midsummer when the garden is at its peak don't fail to gather a full mixed bouquet, and do plan to display it in a raised container with a pedestal base. This is when you can combine a generous sampling of all your garden beauties—delphinium, larkspur, physostegia and snapdragons for height and outer silhouette, trusses of phlox for mass, roses and a stalk of lilies (if you can spare it) for fragrance, Chinese asters or zinnias for variety of shape and color, and before you call it done, add some petunias, coral honeysuckle, sweet pea vines or tiny ivy to trail over the sides. Such massed bouquets intimately bring the outdoors into the home. They need not be formal, for when loosely arranged they have great charm. A smaller and more delicate bouquet can include scabiosa, salpiglossis, blue laceflower, ageratum, some roses and petunias. During a summer heat spell an arrangement of white flowers only, combined with green and white foliage, will bring coolness to your rooms. And for airy grace on an occasional table, half a dozen white cosmos placed in a small, narrow-necked Persian blue vase has delicacy.

Special Materials

Certain flowers and certain leaves I always count on during the summer for particularly special effects. Gladioli I like to use horizontally in an elongated design on my refectory dining table. Since they need green contrast I choose short stems of geraniums, tucking them around the center blooms. Another color combination I like is yellow and gray; therefore dusty miller (*Artemisia stelleriana*) is essential in my garden for combining with marigolds and yellow snapdragons and roses. This gray foliage is equally delightful with pink.

Annuals will provide you with flowers until frost, but by summer's end the perennials, with but a few exceptions, will have had their time. Among these I eagerly anticipate the delicate grace of the Japanese anemones and somehow prefer to let them show off their beauty by themselves, placing them in a low handmade pottery bowl on a teakwood stand.

There are two flowering shrubs, one familiar, the other not so frequently appreciated, which can be called upon to contribute to summer flower arrangements. The purple buddleia combines well with a variety of flowers, but my greatest pleasure comes from bringing indoors some of the white panicles of the sweet pepperbush or summer-sweet (*Clethra*



Roche

The copper tone of the watering-can blends pleasantly with the gold and bronze tones of the garden's midsummer daylilies (*Hemerocallis*).

alnifolia). Added to almost any combination of flowers the clethra is attractive.

Have I left out some of your favorites? You who have slightly different climatic conditions may have other preferences and certainly individual tastes will dictate what you grow and what you arrange. The important thing is never to let yourself get into a rut. ♦

(Continued from inside front cover)

GEORGE H. PRING is Superintendent Emeritus, Missouri Botanical Garden, St. Louis, Missouri, where the collection of tropical waterlilies under his care has long been a notable feature.

ESTHER GRAYSON ROCKWELL and her husband have written some of America's best-known gardening books, among them "Rockwells' New Complete Book of Flower Arrangement" (Doubleday, New York, 1960), "Rockwells' Complete Guide to Successful Gardening" (Doubleday, 1965), "Rockwells' Complete Book of Roses" (Doubleday, rev. ed. 1966).

FRED F. ROCKWELL, for many years Garden Editor of *The New York Times*, is now a gardener and writer at his home in Orleans, Massachusetts. A partial list of the books he and his wife have produced is given directly above.

MARY ELLEN ROSS, Camden, Maine, is a specialist in geraniums, fuchsias and unusual house plants. She and her husband Ervin operate Merry Gardens nursery.

ROBERT H. RUCKER, Landscape Architect, University of Oklahoma in Norman, is Chairman of landscape design for the National Council of State Garden Clubs, Inc.

GEORGE TALOUMIS, Salem, Massachusetts, photographer, author, editor and lecturer, has a special interest in container gardening. He is author of "Outdoor Gardening in Pots and Boxes" (Van Nostrand, Princeton, New Jersey, 1962).

KATHRYN S. (Mrs. Lucien B.) TAYLOR, Dover, Massachusetts, as a writer, teacher and conservationist specializes in the culture of native plants. She was co-author, with Stephen F. Hamblin, of the "Handbook of Wild Flower Cultivation" (Macmillan, New York, 1963).

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JAPANESE HERBS AND THEIR USES

Culinary
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Medicinal
Herbs

Cooking
Chrysanthemums

Flower
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with Herbs

Dictionary
of Herbs

Recipes

SUMMER
1968

NEW SERIES

OL. 24

NO. 2



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Japanese Herbs and Their Uses

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For a list of topics see back cover.



フキ (Fuki)

Petasites japonica Miq.

This Herbal of Japan is the third Handbook on herbs to be issued in the 24 years since **PLANTS & GARDENS** began publication, but is the first to be concerned with the herbs of another land, another culture. I might add that this is the fourth Handbook that Kan Yashiroda has edited in the **PLANTS & GARDENS** series, and it is again a privilege to thank him, as Guest Editor, for his inspired role in interpreting the East to the West. He and the authors he invited to collaborate deserve the warm thanks of all our readers. We are indebted to Mr. Yashiroda alone for the translation of the original Japanese manuscripts.

Botanically, many of the plant families that include herbs are the same for the Far East as they are for the West—the Lily Family (onions), also the Geranium, Mint, Parsley, Composite and other families. But there are also a number of families that surprisingly, to us, include herbs, e.g., the Gentian.

More important in terms of the culinary arts are the Japanese uses of herbs. For example, particular strains of chrysanthemums are considered "cooking chrysanthemums." One of my own favorites is chrysanthemum leaves dipped in batter and fried briefly in hot vegetable oil. This preparation is called **TEMPURA**, and chrysanthemum tempura is a true delicacy. Author Kikudo Ueda holds that a certain cooking chrysanthemum has medicinal properties and that it has cured his diabetes. But whatever the cooking chrysanthemum's qualities as a culinary or medicinal herb, I have a notion that it ought to be introduced to the West as a "new" vegetable, to be cooked tempura style.

Susumu Hamada's charmingly written story about "some of our favorite home-grown herbs" includes a Japanese proverb, part of which is familiar the world around:

"Each to his own taste;
some worm will devour **TADE**."

Now, **TADE** is a particular variety of smartweed, a favorite in Japan, though unbelievably hot to the taste.

Osamu Suzuka tells us that the study and uses of medicinal and culinary herbs in Japan developed largely under Asian influence, e.g., Chinese medicinal herbs were trusted folk remedies in Japan for centuries before the introduction of western medical science. It was chiefly Japan's isolationist policy of many centuries that led to the use of indigenous herbs. The nationalist urge combined with the rich natural vegetation of Japan led to the cultivation and use of native varieties.

Naomi Makiyara notes that the change of seasons influences the selection and uses of various herbs and spices. Herb growers meet the year 'round demand by bringing fresh herbs to market daily and whether in season or out, seeds, swelling buds, slightly opened flower buds, young leaves, etc. are all generally available. Frozen foods have yet to become established in Japan. Here is Mrs. Makiyara's comment, a nostalgic touch for foreigners who have traveled in Japan: "To achieve esthetic perfection, a Japanese meal ought to be eaten tranquilly in a Japanese room within view of a Japanese garden. It takes skill, discrimination, imagination—in short, true artistry—to produce the desired effect." To her, "the combination of nutrition and esthetic aims makes Japanese dishes flavorful and beautiful."

For those who would like to try their luck with Japanese cooking (accent on herbs) turn to the pages on recipes. Recipes are also given in some of the articles. Or, if one's tastes run to the purely esthetic, turn to herbs in flower arrangement.

In the pages of the Botanic Garden's two herb Handbooks, herbs of the East meet herbs of the West. It is with great pleasure that we dedicate this book to members of the Herb Society of America.

George S. Perry

Director

Note: If readers wish to secure herb seeds or other parts of the plants, the Botanic Garden will act as an experimental "clearing house" for orders, at least for a limited time and on a cost basis, and Mr. Yashiroda has been kind enough to offer to procure them for us. If you do write, please understand that it may take some months to secure what you seek, and we can undertake only limited correspondence on top of the thousands of gardening and horticultural question-answering letters that are part of the Botanic Garden's far-flung service.

JAPANESE CULINARY AND MEDICINAL HERBS

Osamu Suzuka

SINCE it is located from 28 to 46 degrees North Latitude (about the north-south equivalent of New York to Georgia in the U.S.A.), Japan is almost entirely in the temperate zone. Warm temperatures and adequate rainfall assure luxuriant growth of our temperate flora. Subtropical vegetation is characteristic of the extreme south, and an alpine flora abounds in the north and in the high mountains. According to Ronald Good (1963), Japan belongs to the Sino-Japanese boreal region; *i.e.*, northern Japan is in the same vegetation region as south Sakhalin, and southern Japan is in the same one as Korea.

Indigenous plants growing under these temperate weather conditions are generally easily cultivated by normal methods; *i.e.*, watering, occasional manuring, etc.—methods common to temperate regions the world over.

In the distant past, the study and uses of medicinal and culinary herbs in Japan developed largely under Asian influences. On the other hand, because of Japan's isolationist policy of the past few centuries, herbs which were indigenous came into their own. It was the nationalistic urge combined with the natural vegetation of our country that led to the cultivation of native varieties of culinary herbs.

Even before the introduction of western medical science to Japan, Chinese medicinal herbs and their indigenous relatives had long been in popular use. These, particularly along with native herbs, also have long been trusted folk remedies.

I will here briefly describe some of Japan's more widely used medicinal and culinary herbs, giving their common and scientific names, the botanical family and the Japanese name.

Culinary Herbs

Wasabia japonica matsumura, Cruciferae;
WASABI

WASABI is a perennial herb found growing near streams in the mountainous regions of Japan. Recently it has been cultivated where water is kept at 11°–14° Centigrade (52°–57° Fahrenheit) all year and where there is no danger of flood. WASABI flourishes in woodland shade, out of the direct sun. The pungent rhizomes attain a diameter of 1½ to 2 inches and a length of 6 to 8 inches. Both the rhizomes and pungent leaf-stalks are used in cooking.

A recent development is a cultivated variety of WASABI which can be grown on drier land; it is now raised in Nara prefecture. This variety is best cultivated under fruit trees at the foot of a moun-

tain. WASABI is rather difficult to grow since it requires the right temperature range and adequate moisture and shade.

Its refreshing pungency makes it an indispensable herb for the Japanese palate. With or without the addition of soy sauce, grated WASABI rhizomes are eaten with sliced raw tuna, bonito and other fish, or as a garnish for hand-rolled SUSHI (cold fish, meat, prawn, cucumber or other item placed on rice ball). Nowadays a condiment called "powdered wasabi" is offered in the market; this is no more than a powdered horseradish (*Armoracia rusticana*, also known as *Cochlearia armoracia*). True WASABI is more pungent and more costly.

Chemically, WASABI's pungency is produced when a glucoside called sinigrin is dissolved by myrosinase.



WASABI, a pungent, horse-radish-like herb, is highly favored as a seasoning. Above left, is a commercial planting; above right, rhizomes of cultivated plants; left, some collected wild plants.

Mioga Ginger (*Zingiber mioga*) Zingiberaceae; MYOGA (OR MIOGA)

Ginger plants abound in tropical and subtropical zones. MYOGA may perhaps be the species distributed in the northernmost region. We do not yet know whether it is indigenous to Japan or whether it

was introduced from China in the remote past. It grows abundantly in damp soil near villages and in nearby ravines throughout Japan from Honshu through

Shikoku to Nyushu and is also cultivated for home use.

The fragrant foliage of MYOGA resembles that of true ginger, but, unlike ginger, the horizontally-growing rhizomes are inedible. In spring, the rhizomes produce shoots about a foot high; several oblong-lanceolate leaves clasp the shoots with their long sheaths. From summer to autumn, MYOGA ginger produces successively cone-like flower clusters $2\frac{1}{4}$ to $2\frac{3}{4}$ inches long, each consisting of about fifteen light yellow flowers. The flowers are popularly appreciated for their fragrant aroma.

After blanching, the young shoots are put on the market. They are used in soups, in TEMPURA (a fried fish dish), pickled and as a spice for bean curd or TOFU. In whatever dish the shoots are used, they enhance the fragrance and add a pleasant tang.

Common ginger grows best in shady, damp places—not where there is sandy soil or direct sun. It is said to be a pentaploid plant with 55 chromosomes and is sterile (does not bear seed). Propagation is achieved by dividing.

Both leaves and flower spikes of perilla are used in various ways, the former in salads, the latter (when young) for tempura and soup; the purple-leaved one gives color to pickled apricots.



Purple Perilla (*Perilla frutescens* var. *crispa*), *Labiatae*; SHISO

The purple-leaved cultivated variety of perilla is an annual herb which resembles the ornamental coleus and which reaches a height of 8 to 16 inches. Its leaves, flowers and seeds give off a unique fragrance caused by an organic compound called perilla-aldehyde.

The tiny seedling plants are used as a spice for sliced raw fish. The leaves are used as a spice for bean curd and as a garnish for TEMPURA; the seeds are used in TEMPURA and as a spice in making various pickles. Purple-leaved perilla makes an effective coloring for pickled apricots, ginger and the tubers of Japanese artichoke (*Stachys affinis*).^{*} Perilla grows well in home gardens, but the seeds will not germinate without first being exposed to a low temperature.

Smartweed (*Polygonum hydropiper*), *Polygonaceae*; TADE

Smartweed is an annual herb, easily cultivated in damp places. The seeds must



^{*} This bears no relationship to the more familiar globe artichoke (*Cynara scolymus*).



be carefully guarded against drying out. The smooth broad-oblong leaves and stems are red. Long spikes appear in the autumn and bear small flowers. The chemical make-up has not yet been determined and may be tadeonal.

Just as for the above-mentioned perilla, smartweed cotyledons are used as a spice for sliced raw fish. These cotyledons are of a purplish-red hue. The ground leaves, made into a vinegar paste, go well with sweetfish broiled in salt. The spikes are added to **SUSHI** eaten with mackerel.

Japanese Field Mint (*Mentha arvensis* var. *piperascens*), *Labiatae*; **HAKKA**

This indigenous perennial herb grows all over Japan. It is easily cultivated in home gardens, especially in slightly wet soil under fruit trees and the like. The square, pubescent stem attains a height of 8 to 20 inches with slightly pubescent leaves 2 to 3 inches long. The plant multiplies by spreading from underground runners.

Menthol ($C_{10}H_{20}O$), 80 per cent of which is derived from the aromatic essential oil of the mint plant, is in great demand for use in the manufacture of



Smartweed is eaten in every stage of growth, from the first two tiny leaves, the cotyledons, to the flower spikes. The leaves themselves are ground to make a vinegar paste.

cakes, perfumes, cosmetics, aromatics, dentifrices, internal and external medicines and refrigerants. The menthol industry has reached the peak of its development in Hokkaido. Since Japanese field mint is more bitter than most mints, it is actually not so good in cakes.

Chrysanthemum morifolium, *Compositae*; **SHOKOYU-GIKU**

Among the ornamental chrysanthemums, strains having no bitterness are selected for use as cooking chrysanthemums. These are as easy to cultivate as ornamental chrysanthemums, but they require a cool climate. A slight bitterness results when the plant is grown in warm regions. The cooking chrysanthemum is largely cultivated in the northern part of Honshu.

When the flowers—yellow-petaled are preferred—are fully opened, they are harvested. After a brief boil, the florets (“petals”) are spread out in a thin layer and then dried for marketing.

Corkwing (*Glehnia littoralis*), *Umbelliferae*; **HAMA-BOFU**

This perennial herb is found on sandy



Corkwing is widespread over Japan's sandy beaches. Agreeably flavored, its young leaves and leaf-stalks are pickled.

beaches throughout Japan. The root grows deep in the sand. The short stem produces long-petioled leaves which are boldly pinnately compound. In the summer close umbels of numerous small white flowers appear.

The young leaves and leaf-stalks are used for their agreeable flavor and fragrance. They are pickled for their fragrance and are often served with sliced raw fish.

Sweet Coltsfoot (*Petasites japonicus*), *Compositae*; FUKI

Sweet coltsfoot is found in the wild all over Japan and is easily cultivated, especially when grown under deciduous fruit trees. It is dioecious (having staminate and pistillate flowers on separate plants; *i.e.*, sexes are separate). The staminate flowers are light yellow, and the pistillate flowers are white, forming a close thick cluster about $1\frac{1}{4}$ to 3 inches in diameter.

The flower-buds (FUKI-NO-TO in Japa-



Flowers of sweet coltsfoot serve as a spice in early spring. Later in the season leaf-stalks are eaten boiled, baked or fried. Pleasantly flavored and fragrant.

nese) appear before the leaves in early spring. Both staminate and pistillate flower-buds serve equally well as a spice. The combination of their unique flavor and fragrance is appropriate for dishes eaten in the early spring. They are chopped and put into soups and boiled fish.

The leaf-stalks are a widely eaten vegetable, flavorsome when either boiled, baked or fried.

Japanese Wild Chervil (*Cryptotaenia japonica*), *Umbelliferae*; MITSUBA

MITSUBA is found growing in shady, damp spots all over Japan. The trifoliate leaves are sessile on flower-stalks and petioled on others. In early summer, tiny white flowers appear in compound umbels. The plant contains cryptotaenene ($C_{10}H_{16}$) and mitsubaene ($C_{15}H_{24}$).

Because of its peculiar flavor, MITSUBA is cultivated as a herb. The leaf-stalks are added to soups and fried foods.

Water Dropwort (*Oenanthe javanica*), *Umbelliferae*; SERI

Water dropwort is a cultivated perennial herb attaining a height of 8 to 24 inches. It multiplies by spreading underground runners. It also grows in the wild along streams and in rice fields. Its leaves are pinnately compound, and its small white flowers grow in compound umbels.

In spring, the young leaves and leaf-stalks are added to soups and contribute a unique fragrance. If water dropwort is grown close to streams, softer leaves are collected.

Asiatic Ginseng (*Panax schinseng*), *Araliaceae*; CHOSEN-NINJIN.

Asiatic ginseng is native to Korea and Manchuria and was introduced to Japan in olden times from Manchuria. Since remotest days it has been highly esteemed as a potent medicine in China, where it was produced in the Shan-si region of Manchuria. Now Asiatic ginseng is grown in the cool, fertile regions of middle Japan, and some of its products are exported to China.



Young wild-chervil leaves are eaten much like spinach. A closely related species, still unappreciated by gourmets, grows in northeastern North America.

Onions (*Allium* species)

Last but not least are the varieties of onion (*Allium*). We particularly enjoy the many distinctive flavors. Among our favorites are chives (*A. schoenoprasum* var. *foliosum*), ASATSUKI in Japanese; *A. grayi*, NOBIRU in Japanese; *A. tuberosum*, NIRA in Japanese; and *A. victorialis platyphyllum*, GYOJA-NINNIKU in Japanese.

Medicinal Herbs

The thick, white branching roots are not usable until from five to seven years after planting. They are sold as medicine in a fragrant, dried state (called NINJIN). NINJIN is said to be a good tonic and excellent for heart troubles.

The roots contain .05 per cent of the essential oil and panaxadiol ($C_{30}H_{52}O_3$). The principal chemical compound is said to be panacene ($C_{15}H_{24}$).

Asiatic ginseng is very difficult to cul-



The decorative grains of Job's-tears (a grass) that appear in autumn on these plants have numerous medicinal uses.

tivate and certainly cannot be grown in home vegetable gardens. Unless adequate conditions of climate, soil, and shade prevail, usable roots will not be produced.

Job's-tears (*Coix lacryma-jobi* var. *mayeun*), Gramineae; HATO-MUGI

Job's-tears is a grassy annual herb grown to some extent in Japan. In the summer the tall, broad, weeping-leaved plant bears small, drooping flowers; in autumn it bears light brown, bony fruits which break easily between the thumbs. These are rich in albumen. Job's-tears is easily cultivated in temperate and subtropical zones. For a prolific autumn crop, it should be sown in rows and well manured.

Job's-tears provides feed for domestic animals. And if boiled down and drunk, the grains are a well known cure for warts on the hands and feet. They are also effective as a diuretic and as an anodyne.

Angelica acutilobam, Umbelliferae; TOKI

TOKI is a biennial herb found in the wild in Japan's mountainous regions and also cultivated for medicinal purposes. It attains a height of 20 to 40 inches. Numerous small white flowers in umbels appear in the summer. The roots contain bergaptene ($C_{12}H_8O_5$) and .02 per cent of the essential oil. It is cultivated with comparative ease in cool, mountainous regions and in home vegetable gardens as well.

The two or three pinnately compound leaves as well as the stems and thick roots have a strong celery flavor. TOKI has been esteemed as a tonic, especially for the ladies.

Cnidium officinale, Umbelliferae; SENKYU

SENKYU is a perennial herb originally from China. As a medicinal herb it has been cultivated in Japan since olden times, especially in cool regions such as Hokkaido and Nagano prefectures. Cultivation is somewhat difficult since tree shade and coolness in summer are necessary. SENKYU does not bear seeds; propagation is achieved by dividing.

SENKYU reaches a height of 12 to 52 inches. It has pale green, pinnately com-



Leaves of *Angelica acutilobam* are esteemed as a tonic, "especially for the ladies." They taste like celery.



Flowers of angelica make the plant worth cultivating for beauty as well as medicinal qualities.

pound leaves; small white flowers in umbels appear in autumn. It is high in enidium lactone ($C_{12}H_{18}O_2$) and enidium acid ($C_{12}H_{20}O_3$).

Like TOKI, SENKYU has a celery-like flavor. The roots are first blanched in hot water, then dried, before they are sent to market. They are chiefly used as a tonic and pain killer.

Goldthread (*Coptis japonica*), *Ranunculaceae*; OREN

Goldthread is a small perennial herb which grows in shade in the mountainous regions of Honshu and Hokkaido. Its evergreen trifoliate leaves vary in lobes and size. Even before new leaves appear in early spring, the stalks develop with a few white flowers. Cultivation is very

difficult, since the conditions which produced the wild plant should be reproduced as faithfully as possible; *i.e.*, goldthread should be cultivated as groundcover in moist, high-humus soil beneath a cool, coniferous forest. In a herb garden, goldthread should be planted in the shade of a tree where the sun never penetrates.

The bright yellow, horizontally-growing roots are used medicinally. OREN, as we call them, have a strong, bitter taste and have been esteemed for ages as a folk medicine for stomach and intestinal ailments. OREN contain 7 per cent berberin ($C_{20}H_{19}O_5N$).

Longspur (*Epimedium grandiflorum*), *Berberidaceae*; IKARI-SO

Longspur is a perennial herb which grows in semi-shady mountainous regions. It is a popular garden plant because of its lovely flowers. It grows best in peaty soil. Before the leaves come out in spring, purplish-red anchor-like flowers appear in racemes.



Goldthread (*Coptis japonica*) is noted for its strong, bitter roots, valued for ages as a folk medicine.

Entire plants are collected, dried and steamed or preserved in Japanese wine (SAKE). They are supposed to be an effective tonic. The leaves contain a glucoside called icarin ($C_{33}H_{42}O_{16}$).

Swertia (*Swertia japonica*), *Gentianaceae*; SEMBURI

Swertia is a biennial plant which grows in mountainous regions all over Japan, especially where there is a clay soil and it is sunny. Thus, cultivation is a bit easier in reddish or brownish clay soils. It succeeds only with difficulty in home herb gardens. It attains a height of 4 to 16 inches.

The bitter-tasting plant is collected, dried and widely used as a folk remedy for stomach ailments. It contains swertiamorin ($C_{16}H_{22}O_{10}$) and an alkaloid called gentianine ($C_{16}H_{19}O_2N$).

Rough Gentian (*Gentiana scabra* var. *buergeri*), *Gentianaceae*; RINDO

Rough gentian is in the same family with swertia and has similar qualities. It



Swertia, a bitter-tasting plant of mountainous regions, is dried and used for stomach ailments.



The bitter roots of rough gentian are used as a digestive tonic. Bright blue flowers (above) appear on the plant in autumn.



Individual flowers of swertia open in autumn. Closely related to the gentians.

is taller than swertia (reaching a height of 1 to 2 feet). Cultivation is comparatively easy; it, too, grows in clay soil. The oval lanceolate leaves are opposite, and pretty blue terminal flowers bloom in autumn.

The bitter roots are used as a digestive tonic. They contain a glucoside called gentiopicroin ($C_{16}H_{20}O_9$).

***Geranium thunbergii*, Geraniaceae; GEN-NO-SHOKO**

This geranium is a perennial herb which grows abundantly in the fields and mountainous regions, its stem spreading over the ground. The three- to five-lobed leaves, also the stems, are covered with soft down. Small white or purplish-pink flowers are borne in the summer. With adequate care, the plant grows well in temperate regions.

In Japan GEN-NO-SHOKO is a popular folk remedy for intestinal troubles. It is also an anti-diarrheal. The entire plant is cut off, dried in the shade, steamed and condensed. It contains about 18 per cent tannin. As it is free from harmful after-effects, this geranium is used as a "medicinal" tea.

Other Folk Remedies

Besides the above-mentioned herbs, there are many widely used folk remedies. I will here briefly mention some.

Houttuynia cordata (*Saururaceae*, DOKUDAMI) is completely dried and used as a diuretic and an antidote for poison. It is easily cultivated in moist soil.

Attractylodes japonica (*Compositae*, OKERA) is used for stomach ailments. The stem and root contain 1.5 per cent of the essential oil, atractylol.

Pink perfection (*Rehmannia glutinosa*), (*Schophulariaceae*, AKA-JIO) after drying, is used as a tonic.

Baikal skullcap (*Scutellaria baicalensis*), (*Labiatae*, KOGANEHANA) is used to reduce fever. Its roots contain woogonin ($C_{16}H_{12}O_5$).

Angelica anomala (*Umbelliferae*, YOROIGUSA) has .04 per cent of angelica-toxin in its roots, which are used to reduce fever and relieve pain.

Sickle senna (*Cassia tora*), (*Leguminosae*, EBISU-GUSA) is native to the tropics of both hemispheres. The seeds, containing emodin, are used as a tonic, medicinal tea and laxative. ♦



Geranium thunbergii, valued folk remedy in Japan for intestinal troubles. Its leaves are made into a flavorful medicinal tea.

SPICES AND HERBS USED IN JAPANESE COOKING

Naomi Makihara

THE wide range in Japanese climate from near tropical to cold north country and in natural features (mountains, seacoast, plains and bogs) makes for an equally great variety of culinary herbs, spices, and special food dishes.

Japanese cooking is generally plain. The main elements of our diet are rice (a staple) and other cereals, vegetables, fish and other marine life. Over the centuries, Japanese cuisine has been developed to please not only the palate but the visual and tactile senses as well. Of course, high nutritive value is important, but the sensual pleasure to be found in eating is never neglected. Preparation of a meal

involves arrangement of food in appropriate color schemes and attractive shapes, always agreeable in touch to tongue and teeth. Then follows consideration of harmonious table settings, with tableware of china, porcelain, bamboo, wood, gold, silver, tin, or other materials. And finally, to achieve esthetic perfection, a Japanese meal ought to be eaten tranquilly in a Japanese room within view of a Japanese garden. It takes skill, discrimination and imagination—in short, true artistry—to produce the desired effect. To me, this combination of nutritive and esthetic aims makes Japanese dishes flavorful and beautiful.

Refined Japanese cooking reaches its zenith, I feel, in our beloved Kyoto. Ever since Senno Rikyu (1522-1591) perfected the formalities of KAISEKI (a light meal eaten before the ceremonial tea), culinary herbs have been more highly appreciated. KAISEKI is ever so popular these days and provides the inspiration for our modern cooking.

The change of seasons influences the selection and uses of various herbs and spices. A few sprigs of the herb that is selected to garnish any dish furnish the desired nostalgic touch of one of the four seasons that we Japanese so keenly feel. Herb growers therefore see that the demand is met. Seasonal herbs are brought daily to the market from growers who generally specialize in only one or a few kinds of herbs. Whether in season or not, seeds, sprouting buds, slightly opened flower-buds, young leaves, leaf-stalks, plant stems, sprays, fruits, roots and entire plants—all are generally available.

The following herbs and spices are an inseparable part of most Japanese dishes:



Entrance to Mrs. Makihara's Tsuruya Inn.

Wasabia japonica or WASABI is a perennial herb resembling horseradish in flavor, cultivated on the banks of streams and not salable until after three to five years' growth. Its grated rhizomes add a pungent flavor to raw fish and soups, and its pickled leaves can be used as garnish.

Prickly-ash (*Zanthoxylum piperitum*) or SANSHO, a deciduous shrub, grows both in gardens and in the wild. Its flowers, seeds and fruits all add a pungent tang to foods. When it blossoms in April and May, the leaves, flowers and immature fruit are either pickled or boiled down in soy sauce and preserved. The dried mature fruits are pulverized and added to other herbs or used alone.

Mioga ginger (*Zingiber mioga*) or MYOGA is a widely cultivated perennial herb; its young leaves and long sheaths give off a peculiar strong fragrance. The minutely chopped leaves and sheaths are used as a garnish for soups or sliced raw fish.

Smartweed (*Polygonum hydropiper*) is the most pungent of many kinds of TADE and therefore the most popular. It is a common weed. The tiny plants in the early stages of germination (cotyledon stage) are much in demand. Chopped or grated leaves are an indispensable garnish for sweetfish broiled in salt.

Purple perilla (*Perilla frutescens* var. *crispa*) or SHISO is an annual plant, cultivated all over Japan. Besides the commonly used leaves of both green and purple varieties, the flavorful flowers and seeds are also favorites.

Citrus junos or UZU is a small cultivated evergreen tree related to the orange. Its fruits and flowers are both in wide demand because of their delightful flavor and fragrance. The strong acidic juice is used year-round as a condiment.

Welsh onion (*Allium fistulosum*) or NEGI is one of the many varieties of onion grown all over Japan. The green leaves and bulbous portion underground are equally enjoyed.

Varieties of garden radish (*Raphanus*



Artistic preparation of dishes at the Inn.

sativus) or DAIKON are used both as a vegetable and a condiment. It is an indispensable garnish for TEMPURA (fried fish).

Common ginger (*Zingiber officinalis*) or SHOGA, originally not found in our country, is now as widely cultivated and used here as in other temperate and tropical lands. The young rhizomes are used as a pickled garnish to enhance the taste of broiled fish. The chopped rhizomes and the juice are added to soups and other dishes. ♦



The author's shop of the Shichimi spices, renowned throughout Japan. It is located near the Kiyomizu Temple in Kyoto. On the opposite page are shown the attractive containers which have recently helped to increase the popularity of the spices.

KYOTO'S TRADITIONAL "SHICHIMI" SPICES

Kimiyoshi Fukushima

THE SHICHIMI spices, which originated nearly 300 years ago during the Meireki era (1653-57), seem to have increased the popularity of spices in the daily food of people in Japan. The enterprise started as a tea booth near the revered Kiyomizu Temple in Kyoto—not far from the present location of the shop. In those early days, ground red pepper was prepared and sold to esthetic devotees who used it to warm themselves after bathing in the Otoha waterfall of the Kiyomizu Temple.

Through the years more spices were offered: ground sesame and ground prickly-ash seeds, also flavored green laver (large, edible seaweed). Finally, in 1816, a mixture of seven spices—namely,

red pepper, white and black sesame, green laver, prickly-ash seed, perilla seed and hemp seed, all ground together—was developed and named SHICHIMI, which means the "seven spices." Hence we call ourselves SHICHIMI-YA or the "House of Shichimi."

Until the middle of the Meiji era (1868-1911), the process of preparing SHICHIMI was very primitive. The work was all done by hand with very simple tools. Since then electrically driven machinery has been employed.

During the wartime restrictions which became acute in 1943, the materials for preparing the spices became so scarce and difficult to obtain that we were almost forced to suspend operations. Nota-

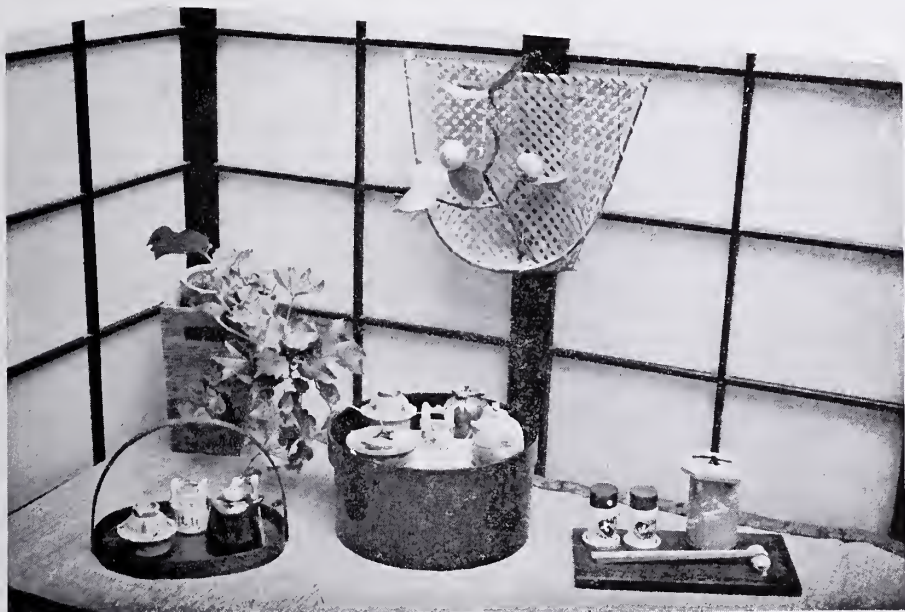


ble advances were made in our business following World War II with the designing of new containers for the SHICHIMI spices. Today our SHICHIMI spices, filling new containers made of famous Kiyomizu ware, are widely distributed not only in Japan but throughout the world.

SHICHIMI spices are used in many foods. They are particularly good in boiled and pickled vegetables, MISO soups, SUKIYAKI, meats and fowl, noodles, TEM-

PURA and roasted fish. The sharp taste of the spices blends well with the flavor of food, drowns undesirable cooking odors and whets the appetite.

As well as the traditional spices, the House of Shichimi also prepares and sells wheat-gluten flavored with SHICHIMI, bean-paste with SHICHIMI added, perilla spice, salted cherry petals and SHICHIMI pickles. ♦



HERBS USED TODAY IN NORTHERN JAPAN

Nobuhide Kato

THOUGH most of the herbs commonly used in northern Japan are about the same as those used in other regions, we can claim a few native varieties and special uses for them.

Both the seeds and the surrounding fruits of the prickly-ash (*Zanthoxylum piperitum*) are popularly used as a spice, either separately, ground up together or combined with pepper. This deciduous, spiny shrub grows wild throughout Japan and is also cultivated in home gardens as a herb.

The young leaves of the prickly-ash are boiled with meats and fish to suppress their strong odors and are sometimes put in soups or added fresh to various dishes to enhance their flavor. They can also be boiled down with sugar, soy sauce and water, to be used as a seasoning for various dishes, or combined with bean paste and used much as you Americans use mayonnaise.

The leaves of the Japanese angelica-



The author beside a small prickly-ash tree; the leaves, small greenish flowers and the fruits are all used in cooking.



The fruits of prickly-ash (reddish in color) are shown here split open and exposing the shiny black seeds.

tree (*Aralia elata*), after being briefly boiled with leaves of prickly-ash, make tasty ingredients for a salad. Leaves of the related *Acanthopanax spinosum* are served in the same manner.

KIRI-SANSHO, the cake which is a specialty of our Tsuruoka City, makes the most of the prickly-ash flavor. The prickly-ash pods are roasted and ground to a powder with mortar and pestle. The powder is then blended with flour and kneaded into a cake. If the pestle is made of *Zanthoxylum* wood, some of its substance rubs off (i.e., is gradually ground into a powder) and passes its flavor into the cake's ingredients. Nowadays, most people don't care what the pestle is made of, but discriminating cooks still cherish a pestle made from prickly-ash wood. Because of the flavor imparted, tobacco pipes made of prickly-ash are sold as souvenirs in northern Japan.

We northern Japanese like spring

herbs with either a strong or bitter flavor and we call them "mountain vegetables." Once spring arrives, we long for them and hurry to fields, hills and mountains—or to the market—in search of them. "Mountain vegetables" grow well in gardens, and many kinds have been successfully cultivated in back-yard gardens.

"Mountain vegetables" which are generally offered in the markets include *Cacalia delphiniifolia*, whose large maple-like leaves, which are not bitter, are served in salads, as boiled greens or in soups. Other popularly used plants are the tassel-flower (*Cacalia hastata* var. *tanakae*), plumed thistles (*Cirsium amplexifolium*), sweet coltsfoot (*Petasites japonicus*) and wormwood (*Artemisia princeps*).

Several varieties of plantain-lilies are readily available in the market-place. The large-leaved plantain-lily (*Hosta montana*) is widely used in salads and soups. On the other hand, *H. rectifolia* and the narrow-leaved, white-edged plantain-lily (*H. albo-marginata*) are rarely gathered, because their young leaves are neither tasty nor large enough.

Some of Japan's most widely used herbs come from the Nettle family (Urticaceae). A favorite herb of which only the leaf-stalks are used is *Elatostema umbellatum* var. *majus*. Also on the market are *E. laetevirens* and the wood-nettle (*Laportea macrostachya*). Many consider catbrier (*Smilax oldhami*) the most popular herb of northern Japan. After a brief boil, the young leaves and stems of the growing tips are served in salads, especially fish salads, or are combined with soy sauce, vinegar and rice wine (SAKE).

It may come as a surprise to you that we northerners use many flowers as spices. This explains, for instance, why the anemone, a small lovely woodland flower commonly planted in rock gardens, is frequently found in grocers' shops in northern Japan, although it is to be found in garden centers in southern Japan.

Although not on the market, the large-leaved violet (*Viola brevistipulata*) is fancied as a herb by some people. Oth-

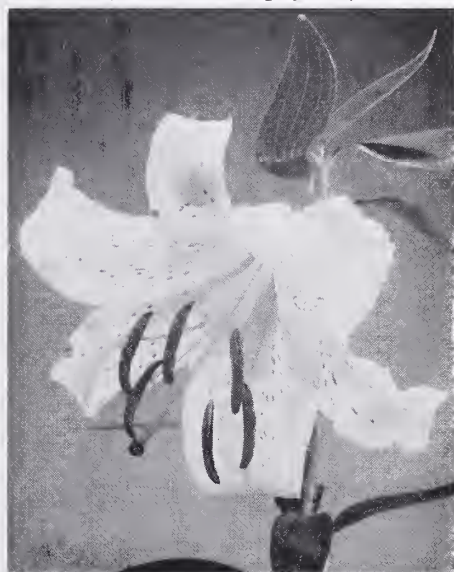
ers enjoy the young leaves of the daylily (*Heemerocallis longituba*, *H. fulva* var. *kwanso*, *H. middendorffi* var. *esculenta* and *H. exaltata*). Bulbs of the well-known goldband lily (*Lilium auratum*), which is abundant in the wild in northern Japan, and the equally familiar tiger lily (*L. tigrinum*, known here also as *L. lancifolium*), are such commonly eaten delicacies they might as well be called vegetables.

I shall here mention only two more herbs that are commonly used: *Wasabia japonica* of the Mustard family and the water-shield (*Brasenia schreberi*) of the Water-lily family are two of the most widely used herbs in Japan.

Our chives (*Allium schoenoprasum* var. *foliosum*) are sold as onions in the market; the plants are also home-grown. Other species of onion, *A. monanthum* and *A. victorialis* var. *platyphyllum*, are less common in their wild state and more frequently grown in home gardens.

As a member of the Japanese Fern Club, I have investigated the uses of ferns as herbs in northern Japan, particularly in our Yamagata prefecture. The young fronds of the ostrich fern (*Mat-*

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Roche

The bulb of the handsome goldband lily is a commonly eaten delicacy.



Gathering smartweed in the garden. To Mr. and Mrs. Hamada this herb, ASABU-TADE to them, is a choice one for the seasoning of TEMPURA and SUSHI. The clump of plants in the foreground is ginger.

SOME OF OUR FAVORITE HOME-GROWN HERBS

Susumu Hamada

DURING my boyhood days, back in the early part of this century, my family had a kitchen garden which yielded enough vegetables, fruits, flowers and herbs for all of us and for occasional gifts to visiting neighbors as well. The kitchen garden grew behind our small community of houses. The ground surrounding the houses was attractively landscaped with trained trees and shrubs arranged with stones, stone lanterns and water basins. A plaster wall enclosed the houses and surrounding gardens. In those days, such typical SAMURAI residences (homes of Japanese army officers), complete with traditional gate, could still be found in Takamatsu, though they grew scarce by the beginning of World War

II. Ultimately ours too went the way of the others; houses and grounds were obliterated during the bombing of 1945.

A few years later, we succeeded in building a smaller house on the old residential site. We planted a garden in front of the house and a kitchen garden in the back yard. In fact, the first task my mother and wife set for themselves was to restore the kitchen garden. They bought small plants from a nursery, found others in friends' gardens and began cultivating vegetables. Thus our SAMURAI residence flourished once again—this time on a more modest scale.

I would like to tell you about some of the herbs which grew in our small, restored kitchen garden. (In Takamatsu

we used to call these family vegetable gardens "SHA-EN.")

One of the twenty varieties of trees we grew was the shapely HANAYUZU, a cultivated variety of *Citrus junos*. This native of Tibet and China is almost as hardy as the trifoliate orange (*Poncirus trifoliata*). The rind of its fruit has a strong aromatic fragrance, and the juice contains an agreeable acid. I bought our tree at a fair celebrating a shrine's festival and carried it home myself. After a year it was a bushy tree nearly 6 feet high and bearing fruit. Every year it bore a goodly amount of fruit that filled our needs from summer to winter.

The rind can be used ground or in slices like a lemon. Like the juice, the bitter yet aromatic rind enhances the flavor of some foods. Despite their good quality, the fruits are either scarce or entirely absent from grocers' shelves. One reason for this is the recent change in Japanese farming—a change which favors more profitable crops. The tree is a poor bearer and the fruit is not worth much commercially. Because the farmer gets a lower price for it than for other more popular fruits, it can be bought only where fancy fruits and vegetables are sold.

HANAYUZU is at its tastiest and most fragrant when it is fresh. For the pick of the crop, therefore, one must grow a tree in one's own garden. Our HANAYUZU tree has always been our pride and joy.

I would also like to introduce our "cooking chrysanthemum." I first tasted it when I was quite young and living with my grandmother while my parents lived away from home because of their work. My grandmother was a connoisseur of foods. She learned how to prepare most seasonal dishes from her mother. My grandmother in turn taught my mother, who taught my wife. Now, whenever I taste a seasonal dish that my grandmother once served me, I recall her great affection for me. One of these traditional seasonal dishes was made from the cooking chrysanthemum and called KIKUMI.

In late autumn, the cooking chrysanthemum opens its medium-sized, double

yellow flowers. We used to help my grandmother gather the flowers, remove the green involucre from beneath the flower-head and separate the rays, or florets. These are then washed and drained. After they are momentarily boiled, they are marinated in a bottle of Japanese rice wine (SAKE) and blended with soy sauce and pickled apricots. This completes the process, and the flowers are then ready for use in making KIKUMI.

KIKUMI is served in a deep bowl from which everyone helps himself. Such a bowl lasts two or three days even if served at each meal. The fragrance of the cooked chrysanthemum florets, blended with the sharp wine, pungent soy sauce and sour apricots, makes a very agreeable combination of flavors. It tastes of deepening autumn and makes me long for one or two HAIKU (seventeen-syllable Japanese poems) to capture the feeling.

I do not know where our original cooking chrysanthemum came from, but it surely existed before I was born. In my boyhood, these chrysanthemums were home-grown and eaten in our region on the island of Shikoku; they have since become scarce. They are highly esteemed among the refined dishes of the tea ceremony and are always used by discriminating tea masters.

After the war, I eagerly looked for a source of cooking chrysanthemums. It was then I learned that the flower is native to the Aomori and Yamagata prefectures in northern Japan. My mother succeeded in importing some through my sister, who was at the time living in Sendai in northern Japan. Once again we were able to cultivate the cooking chrysanthemum. As a boy I thought that KIKUMI was only the name our family traditionally gave the dish, but discovered later that this is its ancient name.

Last but not least, another of our favorite herbs is ASABU-TADE, a pungent-leaved smartweed of the Polygonum or Buckwheat family, or, more exactly, *Polygonum hydropiper* var. *fastigiatum*. When we say TADE we refer to the species and its varieties. *Polygonum hydropiper* is supplied to the market in large quanti-

ties throughout Japan and is used in restaurants, hotels and homes. It is marketed and used in the seedling stage—a few days after the seeds have germinated.

Our kitchen garden was full of the TADE every season. It grew in several varieties: reddish broad-leaved, reddish narrow-leaved and green narrow-leaved. During the war, TADE became scarce. Later, my mother managed to find some seedlings, and TADE grows in our garden again.

A popular Japanese proverb about the herb is: "Each to his own taste; some worm will devour TADE." TADE is unbelievably hot to the taste; still it is a big favorite. Its proverbial pungency has even entered into daily conversation, as can be illustrated by the following typical dialogue:

"How the devil did she fall in love with such a lad?"

"Remember the proverb!"

The pungency of TADE is different from that of WASABI and pepper. Its fresh leaves are used as a garnish for such favorite Japanese dishes as SASHIMI (sliced raw fish), TEMPURA (fried fish and SUSHI (vinegared, boiled rice combined with other foodstuffs). After a mouthful of a particular dish, one savors a TADE leaf.

TADE is a favorite herb in summer cooking. My father often would ask for some TADE leaves to garnish any summer dish. One summer, a friend brought me sweetfish caught in the Yoshino river (the largest river on Shikoku). We broiled the fish with salt and enjoyed them with TADE-SU, which is a mixture of TADE leaves, boiled rice and vinegar. Sweetfish combined with pungent TADE leaves is a special summer delicacy. ♦

HERBS OF NORTHERN JAPAN

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tenuia struthiopteris) appear in great quantities in grocery shops. Since they are not as harsh-tasting as most ferns, they may be fried without any preliminary treatment. Used either as a salad or for boiled greens, they have a delicate flavor. Some like the ostrich fern as seasoning in rice-bran paste. A variety of the North American cinnamon fern (*Osmunda cinnamomea* var. *fokiense*) and the bracken fern (*Pteridium aquilinum*) are popular spring items in the market. All these ferns can also be found in North America.

Bracken-gathering in the hilly inhabited areas throughout Japan is a popular annual outing which takes place in early spring. Sometimes I come across a close relative of the bracken fern, *Cornopteris crematoserrulata*. While this species is more or less edible, it is very harsh-tasting, and unless the young fronds are well blanched before eating, they are poisonous.

Besides the above-mentioned herbs which are sold in grocery shops, the herbs described below are found growing wild nearly everywhere: The horsetail (*Equisetum arvense*) which is found everywhere, is a nuisance as a weed, but a favorite food, the spore-bearing stems being gathered when very young before the crystals develop in the cells. Equally popular are the asters, *Kalimeris pinnatifida* and *K. pseudo-yomena*, woodland chervil (*Anthriscus sylvestris*), common chickweed (*Stellaria media*), meadow-rue (*Thalictrum minus* var. *hypoleucum*), giant knotweed (*Polygonum sachalinense*), Japanese knotweed (*P. cuspidatum*) and sorrel (*Rumex acetosa*). ♦



SOME NOTES ON COOKING CHRYSANTHEMUMS

Kikudo Ueda

DURING World War II when food became scarce, I recalled a variety of chrysanthemum developed solely for culinary purposes in northern Japan. Pressed by the circumstances, I decided to try my hand at preparing not only the cooking chrysanthemum, but also some of the more easily accessible florist varieties growing in my garden. Upon first taste, the flavor of the flowers proved to be rather unpleasant, and I was not sure I could ever come to like them. However, over a period of time, I gradually cultivated a taste for the flavor, and today—some twenty years later—the cooking chrysanthemum has come to be a favorite of mine.

Long before my enforced culinary venture, I had been suffering from a rare form of diabetes (blood sugar of 250) which defied all dietary and insulin treatments. After many years of including chrysanthemums in my meals, the diabetes unexpectedly showed a marked improvement: blood sugar about 120. Today I am fully enjoying life, spending my time investigating and improving chrysanthemum varieties, composing *HAIKU* (17-syllable verses) and writing essays. My good health, I surely believe, is due to the chrysanthemums in my diet.

The following are a few of my recipes for chrysanthemum dishes:

Chrysanthemum Tempura

First, cut a clean, medium-sized flower and place it upright in a container. Prepare a thin mixture of flour and water and pour it over the flower until a thin coating completely covers all the "petals" (florets or rays). Then quickly put the flower into a pan of boiling oil. When the rays open out and become stiff, remove the flower from the oil. It is now ready to be put on the table.

*The brown, papery seaweed, *Porphyra tenera*, is the tastiest, but *Enteromorpha intestinalis* has a more attractive color.



'Niigita' is a good cultivar of the cooking chrysanthemum.

Chrysanthemum Namasu or Fish Salad

Separate the florets from the flower-head. After briefly boiling and cooling them, season them with a mixture of soy sauce, vinegar and sugar. They are then ready to add to sliced raw fish, as a garnish.

Chrysanthemum Salad

Briefly boil the florets, drain off the water and season them with soy sauce and sugar. Serve with bean curds or chopped sesame seeds.

Fish-Seaweed-Chrysanthemum Soup

Gently simmer seaweed* and bonito fish to make a soup. Serve the soup with briefly boiled chrysanthemum florets floating on the surface.

Dried Chrysanthemum Rays

The flowers are gathered in the autumn and the rays, or florets, separated from the head. Briefly boil the florets in salted



The author with some of his chrysanthemums. The flowers he is holding are of the Higo race, developed in Higo province some 200 years ago and now highly appreciated in Japan.*

water. Then immerse them in clear cold water so that they form a thin sheet similar to Japanese handmade paper (a thin but rough brown paper such as is found at the grocery store in Japan) or laver-sheet (a piece of *Porphyra* seaweed). Dry them immediately, as quickly as possible, and store securely in an airtight jar. Just before the dried rays are needed for cooking, immerse them again in water.

*The Guest Editor recalls that the late Mr. Charles H. Curtis, who for several decades was managing editor of the *Gardeners Chronicle* in England, told him that western chrysanthemum growers would consider members of the Higo race as simply weeds. The Saga chrysanthemum, with similarly quilled, slender florets thinly arranged, but standing upright when fully open, is equally revered in Japan. Whether the plant is a culinary herb or an ornamental, it becomes evident that there is an extreme difference in taste between Westerners and Japanese.

Chrysanthemum Pickle

Pick the yellow chrysanthemum when the flowers are almost fully opened. Wash them and remove their harsh chrysanthemum taste by dipping them in salted, boiling water. Add a bit of burnt alum to the salt water if you wish to keep the color of the flowers. After they have soaked in clear water for two or three hours, drain the flowers and let them dry in the shade. Place the separated, dried florets in a jar, and pour over them specially prepared salt water, using salt in the amount of 30 per cent of the weight of the florets. Add a weight to press down the flowers before tightly sealing the jar. The pickle will be ready for use in one or two months.

Sugar and vinegar preserves are made in the same way.

All this talk of cooking chrysanthemums reminds me of a fantastic entry in the great Chinese herbal treatise, the 52-volume *Honso Komoku*, published in 1590. This was a formula for prolonging life and turning white hairs black again. According to the formula, the "sweet" chrysanthemum can accomplish this.

Honso Komoku offers the following instructions:

Gather the young shoots in March, the leaves in June, the flowers in September and the stems and roots in December—each on a certain day of the sexagenary cycle. Dry all these parts of the plant in the shade for 100 days. Powder and mix an even quantity of each on a dog day of the sexagenary cycle. Take a small spoonful of the mixture three times a day. If the dosage is continued for 100 days, one becomes nimble and generous, and one's white hairs turn black within a year. If the dosage is continued for two years, new teeth will grow where the old ones fell out. In the fifth year, an old man of 80 will become like a boy again. ♦

AKITA-BUKI, GIANT SWEET COLTSFOOT

Isamu Ohyama

OUR Akita City in northern Japan is popularly called the city of AKITA-BUKI or sweet coltsfoot (*Petasites japonicus* var. *giganteus*). This perennial herb is distributed from northern Japan to Sakhalin and the Middle Kurile Islands. With circular leaves 5 feet in diameter and leaf-stalks almost 6 feet high, giant sweet coltsfoot is an impressive sight in gardens or in the wild.

It is more than just impressive-looking; it is edible. The leaf-stalks are tasty whether plain boiled or pickled for use in winter as a flavorful green for soup; they are also preserved as pickles with bean paste, SAKE lees (the sediment from the wine cask) or sugar. When SAKE lees are used, SHOCHU, a distilled spirit, is generally added. The flowerbuds, which appear before the leaves in very early spring, are prized as a condiment since they have a slightly bitter yet agreeable flavor. They may be eaten while still green with soy bean paste or boiled down in soy sauce.

The plant is not restricted to use in cooking alone. The mature leaf-stalks can be worked into walking sticks, a firm rod being inserted in the hollow center. The leaves themselves may be used to make a delicate imprint on wrapping paper and craft paper, which have a variety of uses and which are in great demand. Both the flower-bud and leaf-stalk of giant sweet coltsfoot are products for which our city is noted.

According to tradition, Orinosuke Umezu brought AKITA-BUKI to our city in the midst of winter in the late 1840's from the nearby village of Nagaki. The plants were kept in rice husks until spring, then put into the soil, but only two or three survived. These lone survivors are thought to be the original sources of our famed sweet coltsfoot.

Actually, AKITA-BUKI was widely known even in olden times. The story goes that in the Kyoho era (1716-1735), Giho Satake, lord of the Akita clan, made a proud boast to a group of lords gathered in Tokyo (then called Edo) from all parts of Japan. In the wilds of his province, he related, there grew a FUKI or sweet coltsfoot which attained a leaf the size of an umbrella and a leaf-stalk as thick as bamboo cane. The other lords laughed away his words as a fanciful tale; the FUKI they knew was a common herb with a hat-sized leaf and a pencil-thin stalk only two feet high. Giho Satake thereupon ordered his fastest messengers to hasten north to his clan and return to Tokyo with some AKITA-BUKI. After several days travel and much difficulty keeping the plants fresh, the messengers managed to bring plants back—much to the satisfaction of their master. Thus the lord of Akita proved the truth of his story to his noble friends.

To bring his story up to date, many splendid sweet coltsfoot plants are now found growing naturally on Mt. Taihei, Akita City; Mt. Moriyoshi, Minami Akita-gun; Towadako, Kazuno-gun and in other mountain valleys.

Certain methods of cultivating giant sweet coltsfoot have been developed and in general have proved successful. The planting is best done from the middle to the end of June, after the harvesting of the leaf-stalks is finished. Before planting, the clumps are separated. To avoid damage by strong winds, we plant in a sheltered area where the soil is deep and fertile and where there is no risk of a snow avalanche.

The prepared plants are placed in 6-inch-deep holes in rows 12 inches apart. Care is taken not to damage the buds. The plants grow rapidly and vigorously in

fertile soil, soon cover the land with their giant umbrella-like leaves. Shaded by their large leaf-blades, the leaf-stalks grow taller and more tender. The planted area is surrounded with a shelter of rice straw in late April to further ensure the growth of longer and more tender leaf-stalks.

In early November after the autumn harvest, manure is copiously applied. When, by mid-February, the ground is heavily covered with snow, alluvial soil from the river Omono is evenly spread one to two inches thick over the snow. After the snow has melted, the alluvial soil settles down well, firmly covers the underground runners, which otherwise tend to break through the surface soil, and also acts as a fertilizer. Replanting is done in seven or eight years after the clumps have thickened and become more dense. The highest crop is obtained in the third or fourth year after planting.

The best leaf-stalks are generally cut from late May to mid-June when they reach a height of 5 feet. They are cut off near the surface of the soil. Thicker and better leaf-stalks can be obtained by thinning the leaves to one or two in early May.

The flower-buds are in as great demand as the leaf-stalks. They are removed before they open, while still round and compact. If the buds are left to blossom, seedlings will later appear in great numbers and compete with and subsequently weaken the parent plants.

Additional Herbs of the Region

It may also be of interest to know of herbs other than giant sweet coltsfoot, those which are found in the fields and mountains surrounding Akita City. Spring comes suddenly to northern Japan, where we have to spend New Year's Day buried in heavy snow. To our joy, many kinds of herbs burst forth at the same time everywhere. Then our pleasant herb hunts begin, and the streets are filled with temporary herb markets. I will here briefly describe some of our common herbs.

The tassel-flower (*Cacalia delphinifolia*) of the Composite family is a woodland plant about 2 feet high. Its flowers are inconspicuous, but its maple-like palmate leaves (or, more scientifically, delphinium-like) are pretty. The young leaves are eaten freshly chopped for their flavor or enjoyed with soy bean paste or other foods. The related *Cacalia hastata* var. *orientalis* is a perennial herb attaining a height of 6 feet. Its young leaves are used in the same way.

Cathrier (*Smilax oldhami*) is a woody climber. Its young leaves are boiled for greens in May and June.

Aralia cordata is a large perennial, popular all over Japan. It is known as UDO, or Japanese asparagus.

All the above-mentioned herbs are sold regularly in season at market places in Akita City. The following herbs are only occasionally offered in the market:

Corkwing (*Glehnia littoralis*), a lovely seaside plant, related to the carrot, has flavorful leaf-stalks that are covered with sand.

The plantain-lily (*Hosta*) is a popular garden plant. Its young leaves are pickled to bring out their full flavor.

Laportea macrostachya is a perennial herb similar to stinging nettle. Its young stems have a peculiar sweetness when boiled or preserved.

The following herbs are not offered in the market, but are commonly used in many regions:

The ostrich fern (*Matteucia struthiopteris*) is one of the loveliest woodland ferns used in gardens. Its young uncurling leaves ("fiddleheads") are eaten as boiled greens.

Japanese wild chervil (*Cryptotaenia japonica*) is a perennial woodland herb, cultivated for cooking purposes since ancient times. It is cooked in several ways—added to Japanese soup, used for salad, fried, often dressed with ground sesame seeds. Connoisseurs prefer roots.

Allium grayi is a garlic-like plant. The bulbs are eaten with soy bean paste. ♦

A BRIEF HISTORY OF JAPANESE HERB GARDENS

Haruya Shimada

LEGEND has it that oriental medicine originated in China under the rule of Shen Nung (神農) (about 2780 B.C.). (Shen Nung was also reputed to be the sage of farming, which presumably also had its start under his rule.) It is said that Shen Nung beat many kinds of herbs with his red whip and then tasted them to discover which were best. Later he came to know those which possessed medicinal qualities.

In the later Han period (22—250) A.D.), a medical book appeared which was entitled *Shen Nung's Herbal*. It was not written by Shen Nung, of course, but probably by a Chinese Hippocrates of that age: perhaps by Chang Chung Ching (張仲景) or Hua Tuo (華佗). A version reconstructed from secondary sources is the only remaining copy of the *Herbal* left to us.

Shen Nung's Herbal classifies medicines into three grades. There are 120 "good" medicines which restore life, 120 "better" medicines which restore energy, and 120 "best" medicines which cure sickness. The "best" medicines could not be used continuously over a long period of time, because many were of a poisonous nature and thus not unlike some of the present-day medicines.

Japan was influenced by Chinese culture—and medicine was no exception. At first, Japan adopted Chinese medicines indirectly through Korea, but later directly from China.

In the fourteenth year of the emperor Kinmei (554), the herbalists Fan Liang Fong (范良翁) and Ting You Tuo (丁有佗) came to Japan from Korea for the first time. Herb gardens had not yet been conceived, and herbs were still gathered in the wild.

In the first year of the emperor Bunbu in the Nara period (701), a court physician was appointed; a residence was built

for him, and herb growers and students of herbs were named to study with him. They studied from herbals. All this was provided for by statute, after the Chinese system. Thus began Japanese pharmacology and herb gardens.

About the age of Tenpyo (729—748), the South Herb Garden was planted south of Heijo Kyu in Nara prefecture. According to history, a new palace was built here in the first year of the following reign (749) and a Great Thanksgiving Service was held. Somewhere near the presumed site of the South Herb Garden, in Koriyama City, Nara, the centuries-old Herbal Shrine may now be found.

In 753, a Chinese high priest who had advanced the science of medicine emigrated to Japan, and shortly afterward Chinese medicines were imported into Japan. It is interesting to note that many of the medicines imported in those times are perfectly preserved as dried specimens in the Shosoin, an imperial storehouse at Nara, built in 749—756.

The monument at Kyoto tells us that the court physician's herb garden was opened in the sixth year of Showa of the emperor Ninmei (839). Further details are not known; however, a clue to the contents of the court's herb garden is to be found in the Engi-shiki, the set of laws and ordinances established in the first quarter of the tenth century. The thirty-seventh of the fifty volumes of the Engi-shiki (905 A.D.) contains a list of the kinds and quantities of herbs offered in tribute to the emperor. They total 210 in number and are presumed to be herbs gathered not only in the wild, but also those grown in herb gardens. It is reported that in Kazuno-gun, Yamashiro province, pink perfection (*Rehmannia glutinosa*) was planted as a tribute for



This Herb Garden Shrine has been built on the site of Japan's first herb garden, opened in 749 A.D. in Koriyama, Nara prefecture.

the emperor. This planting may very well be included in the herb garden listing.

Thus the medical arts gradually developed, and books on medicine and medical "recipes" were published. This brief flowering of the study of medicine came to a temporary halt when Japan plunged into the dark ages (toward the end of the Heian period, 784—1185, until the beginning of the Azuchi-Momoyama period, toward the end of the sixteenth century). All culture stagnated during this time.

One exception to the general stagnation of culture occurred during the Muromachi period (1333—1573): landscape gardening was developed and culture of ornamental plants as well as herbs became popularized. Among the widely grown plants of this period were such medicinal herbs as balloon-flower (*Platycodon grandiflorum*); tree peony (*Paeonia suffruticosa*); *Paeonia lactiflora*; Japanese apricot (*Prunus mume*) and Japanese cornel, a species of dogwood (*Cornus officinalis*).

Records show that, despite the dark ages, the court physician's residence and herb garden established by law in 701 continued uninterrupted.

During the Azuchi-Momoyama period, Oda Nobunaga permitted Portuguese Jesuits whom he favored to build a Christian church and plant a herb garden of some 120 acres in the foothills of Mt. Ibuki, not far from Kyoto. It is no longer clear exactly where the garden was located. The record shows that many kinds of herbs were brought from Europe and grown there. Today such European plants as meadow peavine (*Lathyrus pratensis*), bush vetch (*Vicia sepium*) and herb Robert (*Geranium robertianum*) are found on Mt. Ibuki. Since these plants grow abundantly in the wild there, but nowhere else in Japan, it is evident that they are the naturalized descendants of the plants from the garden of the Jesuits.

Tokugawa Ieyasu was the first shogun in the Tokugawa period (1603—1867) who encouraged the development of science;

consequently medical arts made great progress under his reign. The second shogun, Tokugawa Hidetada, loved ornamental plants so much that during his reign gardening came into fashion all over Japan. Herb gardens soon became a necessity, not only for providing a liberal supply of herbs, but also as a means of detecting the boguses then beginning to appear in the market place. They also provided a means for the further pursuit of medical studies.

In 1638, the shogun established herb gardens on the north and south sides of Edo castle where he lived and held court. Each herb garden had a superintendent and ten caretakers. Why two herb gardens? In the first place, there had traditionally always been two schools of pharmacology. And secondly, the shogun hoped that the rivalry between the two would promote each herb garden to individual distinction.

The South or Asabu Herb Garden was on a site which is now part of Fujimicho, Tokyo. In 1684, the South Herb Garden was moved to the palace grounds of Koishigawa and exists today as the Koishigawa Botanic Garden, which belongs to Tokyo University.

The North or Ohtsuka Herb Garden was situated within the gates of the Gokokuji Temple, which was abolished in 1681.

South and north herb gardens were also established in that period on Takagamine, the northern hilly area of Kyoto. They supplied herbs chiefly to the Court. In 1680 Kawaguchi, magistrate of Nagasaki, opened a herb garden to grow the herbs brought by Chinese trade ships. It was in the 17th century that many of the feudal clans began to cultivate their own herb gardens, following the lead of the shogun. The Owari clan opened its garden first in 1653.

In 1709, Kaibara Ekiken, an eminent scholar, published the *Japanese Herbs* in 16 volumes. Its four-volume supplement appeared in 1715. One of the first books on the growth and cultivation of crops in Japan was written in 1696, but

was not published until later. This was the *Complete Agriculture* in ten volumes by Myazaki Ante. By this time the collection and classification of herbs had become a popular occupation.

The eighth shogun encouraged the development of industry and of the civil and military arts in the Kyoho period (1716—1736). Of the many herb collectors at this time the most eminent were Abe Tomonoshin and Uemura Saheiji. Tomonoshin, though dealing in herbs (as merchandise), at the same time furthered a knowledge of them. Saheiji traveled and studied throughout Japan, collecting herbs for the shogunate.

Saheiji was sometimes accompanied on his herb-collecting tours by Morino Saikaku, who later established the Morino Herb Garden, the leading private herb garden of the time. Morino had collected plants on a grand scale, a most necessary practice for botanical study two hundred years ago—as it is today. In fact, the extent of his collection was quite unusual in comparison with those in other parts of the world.

From 1756 on, an Assembly of Natural History and Produce was frequently held. This resulted in improvement of varieties of plants, discovery of new kinds, and provision of a place for the exchange of plants and seeds.

Besides the already-mentioned Asabu and Ohtsuka Herb Gardens, there were the herb gardens under the direct control of the Shogunate in Kyoto, Nagasaki, Komaba, Kunoyama and Shunpu. Notable gardens of feudal clans were those of Nanbu, Aizu, Kumamoto, Satsuma, Kuroda, Akita and Shimabara. There were also many small private herb gardens, the largest of which was the above-mentioned Morino Herb Garden, which still survives in Chuda-cho, Nara prefecture.

Among the ancient herb gardens which continue in existence, this and the government-owned Koishigawa Herb Garden are Japan's largest. I will therefore concentrate on these two representative plantings.



The Japanese garden of the 17th-century Koishigawa Herb Garden can still be seen today in the Koishigawa Botanic Garden.

Koishigawa Herb Garden

In 1684, fifty years after the herb gardens were first opened outside Edo Castle, the South Herb Garden was moved to Koishigawa, where 46,000 square meters (about eight acres) of ground were provided. In 1721, additional land—102,000 square meters (17½ acres) was added. When the garden was extended, 22 kinds of plants were added from the Shogun's garden, 47 from Nagasaki, 10 from Kyoto and 8 from Nikko. Noro Genjo added 8 kinds in 1724 which he himself had collected from the Izu islands.

Listed below are the English, botanical and Japanese names of some of the herbs being grown there at that time, with mention of the plant part being used.

Thorowax (*Bupleurum falcatum*), SAIKŌ; root.

Fritillary (*Fritillaria verticillata* var. *thunbergii*) BAIMO; rhizome.

Eucommia ulmoides, TOTYUU; bark.

Ladybell (*Adenophora triphylla* var. *japonica*), SYAZIN; root.

Asiatic ginseng (*Panax schinseng*), NINZIN; root.

Japanese cornel (*Cornus officinalis*), SANSYU; fruit.

Orient-vine (*Sinomenium acutum*), KANBOO; root.

Purging croton (*Croton tiglium*), HAZU; seeds.

Chinaberry (*Melia azedarach*), SENDAN; fruit.

Evodia rutecarpa var. *glauc*, GOSHUYU; fruit.

Water-plantain (*Alisma plantago-aquatica* var. *orientale*), TAKUSYA; rhizome.

Goldthread (*Coptis japonica*), OOREN; rhizome.

Wild-ginger (*Asarum sieboldii*), SAISIN; root.

Lily-turf (*Ophiopogon japonicus*), BAKUMONDOO; tuber.

Amomum xanthioides, SHUKUSHA; fruit.

Baikal skullcap (*Scutellaria baicalensis*), OOGON; root.

Milkwort (*Polygala sibirica*), ONZI; root.

Ephedra sinica, MAOO; herbage.

Monkshood (*Aconitum* species)

Siler divaricatum, BOOF; root.
Angelica acutilobam, TOOKI; root.
 Chinese magnolia-vine (*Schizandra chinensis*), GOMISI; fruit.
 Russian licorice (*Glycyrrhiza glabra* var. *glandulifera*), KANZOO; root.
Cnidium officinale, SENKUU; root.
 Turmeric (*Curcuma longa*), UKON; rhizome.
 Amur cork-tree (*Phellodendron amurense*), OOBAKU; bark.
Attractylodes japonica, SADO-SOOZYUTU; rhizome.

It seems that some kinds were repeatedly replaced with a new supply. The records show that Scotch broom (*Cytisus scoparius*) and blessed thistle (*Cnicus benedictus*) were imported as seeds.

The total amount of herbs supplied annually to the feudal government was as follows:

year	kinds	amount (pounds)
1711	57	973
1712	57	1,142
1713	57	1,498
1714	57	970
1715	59	990

After the herb garden was extended, total herb production was increased, though the number of kinds remained about the same.

year	kinds	amount (pounds)
1724	53	2,853
1725	63	2,862
1726	63	2,968
1727	67	3,010
1728	68	2,772

When the eleventh shogun, Tokugawa Ienari, inherited the herb garden in 1792, he received presents of several plants each of Japanese cornel (*Cornus officinalis*), flowering pink and white apricots (*Prunus mume*), spike winter-hazel (*Corylopsis spicata*), Japanese witch-hazel (*Hamamelis japonica*), weeping forsythia (*Forsythia suspensa*) and a few dozen each of pink and striped camellias. The Herb Garden also customarily presented its herbs to the Court. It is also recorded that the women in Edo castle used the juice gathered from the vegetable sponge, *Luffa cylindrica*, as their eau de cologne.

In the second year of the Meiji, after the Meiji restoration (1869), the Koishigawa Garden was transferred to Tokyo University. Its name was changed to the Koishigawa Botanic Garden in 1875, and it remains under the management of Tokyo University to this day.

Morino Herb Garden

The Morino Herb Garden was established in 1729 in the lonely village of

Entrance to the Morino Herb Garden in Nara prefecture. Dating from 1729, the garden continues today as the most notable private herb garden in Japan.





The Togaku Laboratory in the Morino Herb Garden where Morino Saikaku had studied. The tree on the right is *Stewartia pseudo-camellia*, a native of Japan.

Matsuyama, Chuda-cho, Nara prefecture. It has continued to the present day as the most notable private herb garden in Japan.

Its founder, Morino Saikaku, was born in 1690. ("Saikaku" was his *nom de plume*; his real name was Tosuke, which members of his family retain to this day.) His family's business was the manufacture of starch from the kudzu-vine. He was fond of plants and studied botany, becoming an avid collector as mentioned above. In recognition of his meritorious work, the government gave Morino living plants to enrich his herb garden, among others: Russian licorice (*Glycyrrhiza glabra*), cassia-bark tree (*Cinnamomum cassia*), spicebush (*Lindera strychnifolia*) and Japanese cornel (*Cornus officinalis*).

His son Takesada carried on his work and built the Saikaku shrine in the herb garden in memory of his father. Morino's grandson Yoshinori concentrated on the family starch business and also managed the herb garden well. He erected a monument in memory of his grandfather close

to the Saikaku shrine. The herbarium specimens which Morino Saikaku preserved were put in order by his youngest grandson in 1848. From them we can easily surmise what his garden was like.

It seems almost miraculous that a herb garden started by a humble man could be successfully maintained for two and a half centuries by his family. Several reasons probably account for this.

The Morino family had achieved such success in manufacturing starch—first from the kudzu-vine and later from the fawn-lily (*Erythronium japonicum*) — that it was appointed starch-supplier to the government. Their flourishing business allowed them to maintain a rich herb garden. Also, since the garden was in an isolated spot, it faced little change over the years.

And finally a bit of supernatural aid, perhaps. During his lifetime, the founder, Morino Saikaku, devoted all his energies to the herb garden; after his death, his will provided that his hair and teeth be enclosed in wooden images of himself



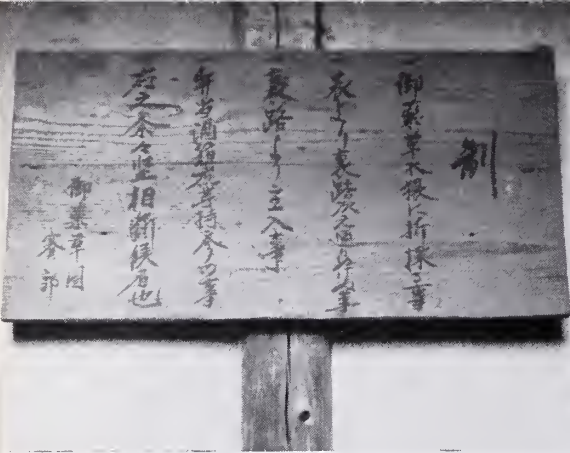
The stone steps that lead to the Morino Herb Garden. Tea-trees and spice-bush (*Lindera strychnifolia*) are at the right.

and his wife. These images, together with an image of his faithful servant Sahei, are in the Saikaku shrine in the herb garden, where they are honored to this day. Their spirits have protected the garden, I suspect.

Now the Morino Herb Garden is preserved as a place of historic interest. It is still the property of the Morino family, but the Ohuda Town Office has been appointed manager. Recently a museum was built to house the historic

The kudzu-vine starch shop of Tosuke Morino, youngest grandson of the founder of the Morino Herb Garden.

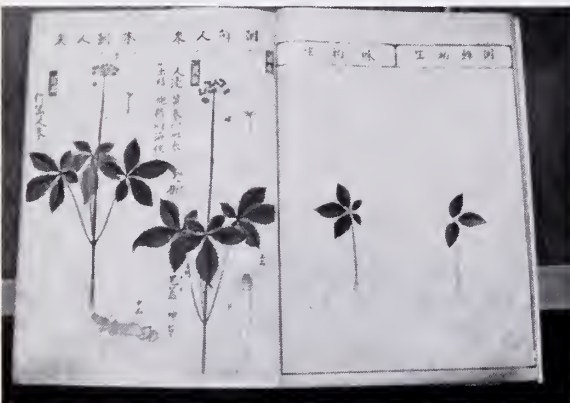




Tablet signed by Saikaku, founder of the Morino Herb Garden, giving rules for visitors. These forbid rampant damage to plants, bringing in sandwiches, wines and the like, entering from the back road, and using the paths as a thoroughfare.



The Saikaku Shrine in the Morino Herb Garden.



The "Matsuyama Herbal" (named after the location of the Morino Herb Garden) was prepared by the garden's founder. The plant at the extreme left is *Panax japonicus*, next is *Panax schinseng*, and at the right are seedlings of *P. schinseng*.

Herbarium specimens of herbs as preserved by Morino Saikaku.



materials, monuments and books. The Town Office also built a rest house.

A giant maple tree (*Acer pycnanthum*), an aged hedge of cassia-bark tree (*Cinnamomum cassia*) and an old Japanese Stewartia tree (*Stewartia pseudocamellia*) are reminders of the more than two hundred years gone by. On the well-utilized hilly grounds, 300 kinds of plants—about 70 per cent of which were planted in the days of Morino Saikaku—are well preserved and cultivated.

The following varieties are naturalized: bigleaf hydrangea (*Hydrangea macrophylla* var. *thunbergii*), tuberous fleecy-flower (*Polygonum multiflorum*), *Magnolia kobus* (KOBUS is the Japanese name), prickly-ash (*Zanthoxylum piperitum*), wintersweet (*Chimonanthus praecox*), Japan caesalpinia (*Caesalpinia japonica*), Asiatic ginseng (*Panax schinseng*), also *Panax japonicus*, Chinese monkshood (*Aconitum chinense*), Japanese cornel (*Cornus officinalis*) and gold-thread (*Coptis japonica*).

On the southern slope are grown *Fritillaria verticillata* var. *thunbergii*, *Angelica acutilobam*, *Cnidium officinale*, *Anemarrhena asphodeloides* and others.

The Morino Herb Garden is not far from Nara City. I hope readers will visit it on some future trip to Japan—which should include a sight-seeing tour of Kyoto and Nara. ♦

MY FLOWER ARRANGEMENTS WITH HERBS

Youho Hano

TODAY more than 100,000 professional flower arrangers throughout Japan tutor young Japanese girls in the art of flower arranging—an art considered essential to the "apprenticeship" of every prospective bride. Therefore there is a great demand for plant materials.

In the development of Japanese flower arranging the aim has been to emphasize the perception of seasonal changes and the beauties of nature. The arrangers seek to convey the tranquility gained from contemplation of natural beauty in their flower arrangements. Plant materials are selected to match one's mood at the time of arranging. Sometimes beautiful flowers are chosen, sometimes flowers with a look of restrained elegance. At other times, colorful or pale wild flowers are selected.

OFTEN we use herbs for flower arranging. Chinese wolfberry (*Lycium chinense*), castor-oil plant, gentian, perilla, parsley, *Cryptotaenia*, ginger and the thorn-apple that grows along hedges or in gardens—all these and many other herbs are enjoyed not only for their cooking or medicinal uses, but for their beauty in flower arrangement as well. Herbs are free from the rigidity of most common flowers used in arrangements. Their natural attractiveness, it is hoped, can be seen in the arrangements illustrated and described here.

My first arrangement is with Chinese wolfberry (*Lycium chinense*), pink stocks (*Matthiola*) and sweet-flag (*Acorus calamus*).

As an arranging material, Chinese wolfberry generally is used in a cascading or hanging style, because of the muscular line and wild effect of its slender growth. In my arrangement I emphasize its inner fineness in different and opposite positions. The bright pink stock brings color to the center of the arrangement. I seem to hear the call of spring in the few pale green leaves of sweet-flag inserted on the lower right side. The vase with its abstract design in red and black provides a

harmonious contrast for the rustic style of the design. A glass vase would also go nicely with this plant material.

My second arrangement is with *Wasabia japonica* and chrysanthemums.

At editor Yashiroda's request, I went hunting wild WASABI—a most popular and important Japanese cooking herb. To my great joy, I discovered for the first time the beauty of the proportionate balance between the leaves and the leaf-stalks and the vigorous, muscular beauty of its root (popular, incidentally, for its pungent flavor).

I have placed the WASABI with two chrysanthemums so as to resemble somewhat a vegetable, a fruit and a delicacy artistically composed on a plate. If my attempt has achieved its aim, I feel that my work was inspired by the qualities of the plant material. It is to give such inspiration that we are always searching for unusual plants and parts of plants.

My third flower arrangement is with prickly-ash (*Zanthoxylum piperitum*), an azalea flower and a Japanese Solomon's-seal (*Polygonatum falcatum*).

The prickly-ash is a popular condiment, but I have not previously seen it used in flower arranging. On my first try,



Springtime combination of young branches of Chinese wolfberry, flowers of pink stock and slender leaves of sweet-flag



Flowering branches of the double pink almond cherry rise above the broad leaves and close-set bud cluster of sweet coltsfoot.



A tall branch of prickly-ash rises from a holder behind the vase, which contains a single azalea flower and a stalk of Japanese Solomon's-seal.



Wild wasabi plants contrasting with yellow chrysanthemums



The globes of small white flowers on the onion-scented stalks of *Allium tuberosum* are here massed high above the single rose-pink flowers of rose-of-Sharon.



This is the arrangement described in the lesson in Japanese flower arrangement given by Mrs. Hano. It is composed of scouring-rushes, adonis flowers and three small cherry branches with pink flower buds just about to open.



Autumn is made doubly evident by combining chrysanthemums in this arrangement with fruiting branches of pomegranate.



Tall leaves of *Allium grayi* are allowed to bend for abstract effect in this arrangement with chrysanthemums.



The author arranging flowers

I was charmed by the beauty of its slender, delicate lines. To harmonize with these lines, only a single branch of azalea was used. Solomon's-seal was added as the seasonal touch of May. Feeling it a pity to remove the lowest leaves on the prickly-ash branch as is usually done, I let them remain and made good use of them. I had the prickly-ash foliage touch the vase by keeping the branch in a holder just behind it. A most unusual way of arranging!

The rootstocks of Solomon's-seal are said to be good for bruises. We grow it and its cultivated variety in our gardens.

My fourth flower arrangement is with sweet coltsfoot (*Petasites japonicus*) leaves and flower-head and the double pink almond cherry (*Prunus glandulosa* var. *alboplena*).

The pink or white double-flowered almond cherry is a small bushy shrub of quick growth, esteemed as a material for the classical as well as the modern style of flower arranging.

The young flower-head of sweet coltsfoot is a well-known cooking herb whose pungent flavor is agreeable though somewhat bitter. The leaf-stalks are a common vegetable found at the green-grocer's.

My fifth flower arrangement is with *Allium tuberosum* and rose-of-Sharon (*Hibiscus syriacus*).

Here my object was to create a mass effect of the strong, onion-scented *Allium*. The lovely little white flower-heads appear in abundance in the summer just as the rose-of-Sharon is continuously opening its large, gay-colored flowers. It is said that dried white rose-of-Sharon flowers are a cure for intestinal troubles—as a lubricant.

My sixth flower arrangement is with pomegranate branches and large white chrysanthemums. For it I have selected a deep blue vase to suggest the autumn sky.

From olden times the pomegranate tree has been a favorite for flower arranging, after the style of the ancient southern Chinese school of painters. These painters were inspired by the interesting natural lines of its branches and by the variation in form and color of its fruits. We flower arrangers of today also favor the pomegranate.

The leaves of pomegranate are comparatively difficult to deal with in flower arranging; therefore, the branches should be given priority in the design. This is an important point to remember when using the pomegranate. Much care should be taken not to lessen their beautiful lines or to spoil the balance of the fruits.

To complete the arrangement and give it a touch of cool, refreshing autumn, I have added three large white chrysanthemums. I took care to select well-shaped flower-heads.

My seventh flower arrangement is with *Allium grayi* and chrysanthemums.

A quality we have recognized in abstract painting appears in the lines of the *Allium* leaves: the natural breaking or bending lines which happen in the course of the leaves' growth. Technical skill should be used in adapting these.

The leaves which could not stand alone

I tied at two points. As they still were not strong enough to stay upright, I forced them into position by inserting a chrysanthemum stem amidst them. To give a feeling of space and distance, I added a few medium-sized white and small yellow chrysanthemums. As a result, the green slender lines of the *Allium* not only feel lively but look lively, too.

I shall tell you of some of the uses of this *Allium*. The bulbs and young leaves, with their light onion odor, are a popular spring herb. It is said that the young leaves when naturally blanched under snow are much favored in northern Japan. *Allium grayi* is still sometimes esteemed as a folk medicine, but is less frequently used than other members of the onion family.

A Lesson in Japanese Arrangement

I should like to give a brief step-by-step illustration of our Japanese art of flower arrangement, using the common scouring-rush or horsetail (a Japanese variety of *Equisetum hiemale*.) It is a popular Japanese garden plant.

1) Toward the extreme left of the plate, place three flower-holders for the main objects; one-third of the way to the right, place an additional two holders. Now it is ready for arranging.

2) Insert seven scouring-rushes, making them stand in the complicated way that is natural to them.

3) Then add several smaller scouring-rushes, inclining them toward the front.

4) Insert several still smaller rushes in the right-hand holders. The shortest ones

are arranged so that they resemble a younger growth.

5) To the left and right-hand holders add a traditional auspicious flower for the New Year's Day, also a few golden Amur adonis flowers (*Adonis amurensis*).

6) Insert a Japanese cherry branch with a few opening flowers in the left holders between the tall and short scouring-rush groups. Close to this cherry branch, add a shorter one with a few flower buds inclining towards the front. Insert the third and shortest cherry branch to the right front side, as I am doing in the photograph.

I used Japanese scouring-rush as the principal material to show signs of the coming spring. By adding the budding cherry branches, my idea was to suggest a bit of the gloriousness of spring. For Japanese flower-arranging, the branches of flowering cherry selected are generally not in full flower. They either have only a few flowers open or, preferably, are just showing pink.

The small clumps of adonis were arranged to remind us of a little Japanese garden. ♦



Beginning an arrangement lesson—a low container with holders put into place



The first plant materials—seven scouring-rushes set naturally in one holder



Additional but smaller scouring-rushes are inclined toward the front. (Hano)



After still smaller rushes are inserted at the right, flowers are added. (Hano)



TWO JAPANESE HERBS IN A FLOWER ARRANGEMENT

Shoho Yamaguchi

TWO very popular Japanese herbs that are grown not only as garden plants, but used for flower-arranging as well, are Chinese wolfberry (*Lycium chinense*) and silveredge (*Farfugium japonicum*, formerly called *Ligularia kaempferi*).

The three arching sprays in the flower arrangement I made to accompany this article are of wolfberry, a slender, thorny, deciduous shrub which grows in abundance in the wild in central Japan and southward into China. In the autumn its branches are heavily laden with small scarlet berries, and it is a most sought-after plant for flower-arranging. A *Lycium* bonsai is one of the most brilliant of autumn sights.

We also like to cook with *Lycium*. For example, the fresh leaves boiled with rice make a pleasant dish. Many people regu-

larly drink *Lycium* "tea" in place of tea from tea leaves, believing it to be good for their health. The wine made from *Lycium* berries is also popular for its supposed health-giving qualities.

The leaf-stalks of silveredge are boiled, skinned of their outer bark and served like those of sweet coltsfoot (*Petasites japonicus*). The fresh juice is said to be a good antidote for fish meat poisoning, and the broiled leaves are a suppurative.

Silveredge is popularly known in some other countries as leopard-plant, so called because of the fine white or yellow spots on the leaves. The large, round, evergreen leaves make it stand out among other seaside perennials, especially in early winter when its bright yellow flowers appear. ♦



Chinese wolfberry and silveredge, both of them popular as culinary herbs, are combined here in ornamental fashion by Mr. Yamaguchi.



An arrangement of common reed, bright blue dayflowers and snake gourd, by Mr. Hisaoka.

FLOWER ARRANGEMENT WITH AUTUMN MEDICINAL HERBS

Wngai Hisaoka

IN autumn, the wind bends the tall, feathery panicles of the common reed of Japan (*Phragmites longivalvis*) toward the east. This is a typical sight along streams or ditches. From summertime on, along field paths, common dayflowers (*Commelina communis*) open clusters of lovely blue flowers for a brief moment of the day. In the autumn the flowers are bluer and stay open longer.

Another typical autumn herb which is an impressive sight in the countryside is the Japanese snake gourd (*Trichosanthes cucumeroides*). It can be spotted occasionally climbing up bamboo trunks or over bushes. Its small, more or less egg-shaped fruits are vermillion-colored. They are easily distinguished from the snake-like fruits of the popular Indian snake gourd (*T. anguina*) which is grown for ornament, as well as food. Japanese snake gourd is often used for flower-arranging; even more often, for twining

round or hanging from a live or dead branch.

The medicinal uses of these three herbs are as follows:

Extract of Japanese common reed (boiled down from the roots) is used to stanch the flow of blood, also as a diuretic, and as an antidote for poison from spoiled fish, pork, crabs, etc. The Ainu tribe in Hokkaido eat the young underground shoots.

Extract from the dried foliage of the common dayflower is also an effective diuretic. Some persons prefer to relieve an empty stomach by combining it in equal parts with a plantain foliage extract and some sugar. It is also said to be good for sore throat.

The dried tubers of Japanese snake gourd are used as a diuretic and as a blood purifier. The starch made from the tubers makes a nice baby powder, though another species suits the purpose better. ♦

A CLASSICAL AND TWO MODERN FLOWER ARRANGEMENTS ACCENTED WITH HERBS

Kando Takagi

A BONSAI-LIKE old pine branch covered with gray lichens looks well in a carefully chosen vase. To complement this, I arranged on a flat plate a mass of smaller branches of shrubs together with sprays of tree peony. Four slender young bracken fronds were placed on the extreme right to break the monotony and at the same time harmonize with the small branches. Since two such

arrangements of woody plants are supposed to be a propitious combination, the entire dual arrangement symbolizes a celebration.

The bracken (*Pteridium aquilinum*), or WARABI in Japanese, is a favorite spring herb for us. WARABI hunting in fields and foothills is dear to the heart of every Japanese, whether he lives in the country or the big city where the herb is



This dual arrangement in classical style is symbolic of a celebration. On the tray below the lichen-covered pine branch are bits of shrubs, tree-peony blooms and slender young fronds of bracken.



A field outside Kyoto in late autumn suggested this free-form combination of Job's-tears, balloon-flower and Japanese wormwood.



Mature fronds of bracken fern, kudzu-vine and sprays of buckwheat comprise this arrangement of herbs.

seen only at the greengrocer's. When the harsh taste has been thoroughly withdrawn, the young growths can be served and enjoyed for their unique flavor. A word of warning: Unless the harsh taste is completely removed, the plant has a poisonous effect. To remove this, boil the young bracken growth for a few minutes only with a pinch of wood ash. Or, if one likes a nicer green color, a pinch of alum can be substituted for the wood ash. (A pinch of soda may also be substituted for the wood ash.)

In the Orient the tree peony (*Paeonia suffruticosa*), "king of flowers," has since ancient times symbolized wealth and honor. It is also highly valued for medicinal purposes. Its root-bark is used to cure many diseases. China is (or was) a source for exporting the root-bark to Japan and other countries.

My second flower arrangement was made with the kudzu-vine (*Pueraria lobata*), bracken fern and some sprays of

buckwheat. To me the arrangement expresses a brief, late autumn day when we happen on a field where the large kudzu-vine leaves are interspersed among bushes whose foliage turns deep yellow and red.

The kudzu-vine's fleshy roots yield an excellent starch which is produced mainly in winter. Both bracken and kudzu-vine starches are used in making first-rate cakes. SOBA, or vermicelli made of buckwheat, is highly thought of, too. My flower arrangement may thus be called a gathering of the mother of delicacies, full of Japanese flavors.

The third flower arrangement consists of Job's-tears (*Coix lacryma-jobi*), blue and white balloon-flower (*Platycodon grandiflorum*) and a Japanese wormwood (*Artemisia princeps*). To me it expresses an idyllic aspect of a late autumn field on the outskirts of Kyoto.

An extract made from dried balloon-flower roots is much used in making cough medicine. ♦

A DICTIONARY OF POPULAR JAPANESE HERBS AND THEIR USES TODAY

Kan Yashiroda

WITH the accumulated wisdom of thousands of years of oriental culture and civilization came the discovery and utilization of tens of thousands of different kinds of plants. In contemporary life, a goodly number of these have been forgotten, but many are still a vigorously rooted part of our heritage and are frequently used by modern Japanese. Many of these herbs could also, to a greater or lesser degree, be adapted by the Westerner—if he knew of them and could be educated in their proper use.

When I was asked to be Guest Editor of this Handbook, I recalled a passage from David Fairehild's *Exploring for Plants* (Macmillan, New York, 1930) which described the experiments carried out by Professors Bois and M. Delaeroix in Paris on *Aralia cordata*, the Japanese udo plant. Fairehild felt that the work with udo provided a good example of how experimentation could reveal the excellent qualities of herbs not yet known in the West. He felt that udo deserved a place with celery on the American menu.

I hope that udo will become better known—not only from "New England north into Labrador," but also in the warmer south.

Many other Japanese herbs could and should be adopted into cultivation in the United States.

Cattail Family (TYPHACEAE)

Common Cattail (*Typha latifolia*)

Cattail is widely distributed in the marshes and along the brooks of the northern hemisphere. It attains a height of 3 to 6 feet, with long, slender leaves.

Use: The dried pollen is used as a medicine. It is said that people also eat the pollen and sometimes even the young, aromatic leaves.

Horticultural use: The cylindrical, candle-like spikes are much used in flower arranging. The smaller *Typha angustata* is better for garden ponds.

Culture: It is easily cultivated, thriving in ponds and wet soil. The variegated cultivated variety also thrives and is a good ornamental plant for gardens and flower arrangements.

Harvesting: The pollen is collected when mature, but before it scatters.

Arum Family (ARACEAE)

Sweet-flag (*Acorus calamus*)

This aromatic evergreen perennial herb is distributed in temperate regions.

Use: It is a traditional Japanese custom to take a medicated bath in the aromatic leaves of sweet flag on the festival which



Roche

The pollen that comes from cattail spikes, when dried, has medicinal uses.

occurs on the fifth of the fifth month. The rootstalks are made into a medicine.

Horticultural use: The slender, glossy plants grow nicely along a stream or in wet soil. The dwarf *A. gramineus* looks even better, especially in small gardens. The smallest cultivated varieties—only about an inch high—are often prized as companion planting, for example, as with bonsai.

Harvesting: The rootstocks are cut lengthwise.

Roche



Sweet-flag leaves which are evergreen in frost-free regions, are used for a medicated bath.

Roche



The rhizome of sweet-flag is made into a medicine.



Allium fistulosum, a most extensively grown onion for commercial production and home use.

Lily Family (LILIACEAE)

Chinese Onion (*Allium chinense*)

This neat, dainty onion came from China to Japan in ancient times. Widely cultivated and used, it produces lovely pinkish-purple flowers in the autumn.

Use: The bulbs, which have a mild odor of onion, are pickled in vinegar, with either sugar, honey or soy sauce added. They can also be preserved in salt, SAKE lees or sweet SAKE.

Horticultural use: The flower-stalks attain a height of about 1 to 1½ feet, bearing 30 flowers. It is a lovely plant for borders or rock gardens.

Harvesting: The bulbs are dug out in the second or third year after planting, after the leaves wither in early summer. By this time they have multiplied.

Welsh Onion (*Allium fistulosum*)

As the common onion is to Westerners, NEGI or *Allium fistulosum* is to us Japanese. It is said to be native to western China. In some cultivated varieties, the hollow leaves attain a length of 1½ to 3 feet.

Use: Visitors to Japan should taste its green leaves; or, better yet—and especially in autumn and winter—its blanched stems and crowns in sukiyaki. Many other Japanese dishes contain NEGI in some form.

Harvesting: The fresh leaves are used as they grow or the stem and crown are blanched before being harvested.

Horticultural use: NEGI is extensively grown for commercial production and home uses. The variegated cultivated variety is less frequently grown as an ornamental plant by a fancier.

Allium grayi and others

This common plant is native to Japan and China. Its slender flower-stalk reaches a height of about 3 feet, with a few very long leaves.

Use: When it appears in the spring the small bulb is cooked alone or in a dressing for vinegared bean-cake. In the North, the young leaves which are naturally blanched while pushing up through the snow are highly esteemed in the early spring.

Allium sativum var. *japonicum*, long cultivated in Japan, is a relative of European garlic and is used in much the same way.

Chives (*Allium schoenoprasum* var. *foliosum*) is the favorite onion of mountain folk.

Allium tuberosum

This dainty, flat-leaved onion has been cultivated in the Orient since ancient times. In summer it opens small white flowers in small heads. It quickly forms tidy clumps.

Use: *A. tuberosum* leaves, stewed and pickled, make flavoring for soups and rice porridge. Some growers blanch the leaves; some prefer to salt the flower-heads. The seeds are used for medicine. Bulbs are not used.

Horticultural use: I have not seen it cultivated as a garden plant. However, its tufted growth, dotting the underside of a hedge, is not lacking in ornamental value.

Harvesting: The leaves are cut off as needed for culinary use; they grow back almost immediately.

Anemarrhena asphodeloides

This perennial herb with its tufted, linear leaves is native to northern China, which exports it annually in the form of a crude drug. It is also grown in Japan for the same purpose.

Use: The rhizomes are made into a medicine.

Horticultural use: It makes a graceful border plant with its long scapes of pale purple-striped white flowers.

Harvesting: The rhizomes are harvested in the autumn and dried.

Ginger Family (ZINGIBERACEAE)

Alpinia species

Many species in this genus are found in the tropics and in warm temperate regions. Because of their decorative leaves and handsome flowers, they are often grown indoors in cooler climates; hence, most are known as



Alpinia formosana. The author has a weakness for the leaves of this member of the Ginger Family. It imparts a pleasing fragrance to his lunch package when he goes angling.

"stove" herbs. Ours are among the hardiest species. All of the plants have an agreeable odor.

Alpinia japonica. The spikes of the numerous pink and white striped flowers make a handsome contrast with the large, ginger-like evergreen leaves. The plant is found in the wild in the northernmost warm regions of Japan.

A. formosana. This herb is native from southernmost Japan through the Ryukyus to Taiwan. *A. intermedia*, which has the same natural distribution, is said to be a natural hybrid between *A. formosana* and *A. speciosa*. The latter grows in slightly warmer climates, but in nearly the same distribution.

Use: The seeds of all these herbs are used as an aromatic aid to digestion, but the seeds of *A. japonica* and *A. formosana* are inferior to those of *A. intermedia* and *A. speciosa*. Since the leaves impart a pleasing fragrance, they are often used as an inner wrapping for the Japanese lunch package.

Horticultural use: They are all very decorative garden plants, giving a tropical effect. In my garden, where the temperature has gone down to 8 degrees below zero, *A.*

japonica, *A. formosana* and *A. intermedia* have passed the winter without any damage to their foliage.

Mioga ginger (*Zingiber mioga*)

The stem of this deciduous herb attains a height of 1½ to 3 feet, bearing several elliptical-lanceolate leaves. In the autumn, conelike inflorescences appear close to the ground. From them emerge pale yellow flowers with lovely lips.

Use: The sharp-tasting inflorescence is used in soups, fried foods, vinegared dishes and is pickled with salt, vinegar or SAKE lees. The young leaves are also esteemed for making soups and other dishes.

Horticultural use: A variegated cultivated variety is grown in gardens and used for flower arranging. This herb, hardier than *Alpinia*, is worth growing if only for the unusual way in which it produces its flowers, lovely only for a day.

Harvesting: Either in the early stages or before the flowers open, the inflorescences are harvested and used while fresh. The young leaves are used preferably after blanching.

Lizard's-tail Family (SAURURACEAE)

Houttuynia cordata

This perennial herb reaches a height of 1 to 3 feet. The showiest part of the plant is the snowy white, cross-shaped bract which appears in early summer.

Use: The dried plant is made into a crude folk remedy which sometimes has a very strong odor. It is applied to tumors and wounds, and sometimes put into baths.

Horticultural use: *Houttuynia* looks nice when planted in groups in damp places, but one must beware of its indestructible and invading nature once it is firmly rooted; it can become an aggressive weed. There is a variegated cultivated variety.

Harvesting: The entire plant is harvested and dried in summer.

Buckwheat Family (POLYGONACEAE)

Smartweed (*Polygonum hydropiper*)

This annual herb grows along brooks or in damp soil. It reaches a height of 1 to 2 feet, with numerous lanceolate leaves. In autumn, smartweed produces slender panicles of small white flowers.

Use: The fresh, pungent leaves are used to garnish many dishes. Young seedlings are a common market product. Cultivated varieties such as slender-leaved *P. hydropiper* 'Fastigiatum' are the connoisseur's delight.

Harvesting: The fresh leaves are cut as wanted. If used in the seedling stage, the plant is cut off close to the soil just when the first true leaves emerge.

Goosefoot Family (CHENOPODIACEAE)

Lamb's quarters (*Chenopodium album* var. *centrorubrum*)

This stout shrub with vigorous stem grows to a height of 5 feet. It is supposed to be a nourishing herb, introduced from the South in ancient times.

Use: The young leaves and tips, slightly boiled, are used for salads or fried in oil. If eaten continuously and in large amounts, however, the plant occasionally produces toxic symptoms.

Horticultural use: Ancient Chinese herbs relate that if a person uses a walking stick made of chenopodium every day, he will live long. I don't know of anyone who has proved or disproved this theory—but I do know that it makes a light, handsome walking stick. A friend of mine, a postmaster, had a hobby of growing chenopodium for walking sticks, and he taught me much about the interesting techniques he used.

Culture: Cultivation for food use is so easy that there is no need to write about it. But the techniques for growing chenopodium to make into walking sticks are too complicated to describe in this brief treatise.

Water-lily Family (NYMPHAEACEAE)

Water-shield (*Brasenia schreberi*)

This small aquatic plant is widely distributed in Asia, Australia, West Africa and North America. The submerged parts are coated with a thick, transparent jelly.

Use: The young, curled leaf tips, which are very thickly coated with jelly, are used in soups, flavored with SAKE, soy sauce and vinegar, or dressed with vinegared bean cake. They can be pickled and stored away for future use. If eaten as a dish in themselves, the leaves should not be seasoned in any way. Thus you may "taste" the tastelessness and appreciate the texture of the jelly when it touches your tongue and throat.



A tree peony (*Paeonia suffruticosa*) in full bloom is surrounded with *Petasites japonicus*.

Buttercup Family (**RANUNCULACEAE**)

Goldthread (*Coptis japonica*)

The fat, bitter roots of this small, ever-green woodland plant yield a tonic. The North American species, *Coptis trifolia*, can also be found in Japan's alpine regions, but is generally not used medicinally here.

Use: *C. japonica* is extensively grown for medicinal purposes in several parts of Japan.

Culture: In autumn, the seeds are sown in the shade and transplanted two autumns later.

Harvesting: The plant is harvested after four or five years' cultivation in the shade.

Peony (*Paeonia lactiflora*)

Tree Peony (*Paeonia suffruticosa*)

These familiar garden plants have been esteemed as medicinal herbs also since the ancient oriental herbarists described their curative value. The tree peony is grown annually in great quantity solely for its rootbark, which is used as a medicine.

The small, globular-flowered *P. japonica* is a lovely plant, even for the smallest of herb gardens.

Mustard Family (**CRUCIFERAE**)

Wasabia japonica

This is the hermit of all popularly known herbs. WASABI grows only on cool, wooded clear-aired mountains, where cool, clear waters flow and where it cannot be touched by direct sunlight. In contrast to its elusive nature, its processed rhizomes are found all year round in restaurants, hotels and city-dwellers' homes. WASABI is a favorite herb and a common household word to the Japanese.

The rhizomes are generally about 1 inch thick and 5 to 7 inches long (or occasionally almost a foot long). They are thickly covered with leaf scars. As the rhizome ages, lateral rhizomes grow from the buds imbedded close to the scars. Glossy, green cordate leaves crowd the stems, and the leafstalks are from 8 inches to a foot long. Flower scapes 12 to 20 inches high appear above the leaves in April and May. They bear small white flowers.

Use: The entire plant has a uniquely strong and agreeable pungency which appeals to the Japanese. Incidentally, people who relish horseradish will find WASABI

similar in taste. In fact, we call horseradish "farm wasabi."

The grated rhizome is added to soup just before it is served. It is also added to bean paste, chicken and fish. After being soaked in salt water, the rhizomes and leaf-stalks are preserved in SAKE* lees.† WASABI loses flavor a few hours after it has been grated. The best rhizomes retain their flavor three or four hours, while the inferior ones keep it only one or two hours.

Horticultural use: The "hermit" acclimatizes better than one would think. A noted amateur wild plant enthusiast once visiting me was surprised to find WASABI flourishing in our hot, dry place. Since that visit, he too admires WASABI as a garden plant and has succeeded in growing it equally well in the smoky city of Osaka. The combination of pretty leaves, lovely flowers and tidy growth makes it a nice garden plant for growing in situations with northern exposure. Personally, I have never thought to use the rhizomes, only the leaf-stalks.

Culture: The preparation of the soil for commercial growing areas is a very expensive process, and varies from district to district, each having its own traditional method.

Briefly, a layer of small stones is laid under water, and cool water is kept constantly running over the stone "bed." It must not be allowed to stagnate. WASABI is planted quite close to the surface or just pressed under a stone about 6 inches in size, two plants to a stone.



Saxifraga stolonifera. As a common name mother-of-thousands implies, this well-known plant grows rapidly in the house or outside in shady places in frost-free regions where it quickly becomes a ground cover. It has culinary as well as medicinal uses.

Harvesting: WASABI rhizomes are said to be best when harvested 15 months to two years after planting.

Saxifrage Family (SAXIGRAGACEAE)

Hydrangea macrophylla var. *thunbergii*

This small deciduous shrub, a variety of the florist's hydrangea, has narrow, elliptical leaves. In summer, flowers in shades varying from blue to pink appear in a large, dense, rounded cluster. They are sterile; that is, seeds never form.

Use: The withered leaves, when dried and rubbed in one's hands, become very sweet. "Sweet tea" is made from them. The sweetness is said to be twice as strong as that of saccharin. In many temples, "sweet tea" is offered to worshippers on the anniversary day of Buddha's birth. Drug manufacturers also find uses for it.

Horticultural use: It is attractive in groups or placed among low-growing plants (about 2 feet high) in herbaceous borders.

Strawberry Saxifrage (*Saxifraga stolonifera*)

This plant has long been known botanically as *Saxifraga sarmentosa*. For centuries its other common names have been strawberry-geranium, old man's beard, mother-of-thousands, etc. It is not very flavorful, but has other virtues which do not allow me to omit it.



Wasabia japonica. A most popular culinary herb in Japan.

†The dregs in the wine casks.

*The usual Japanese rice wine.

Use: The juice and lightly toasted leaves are esteemed as crude folk drugs. The leaves are relished when fried, and also, after being slightly boiled, in a salad. It is sometimes said that the flower scapes are tasty when salted.

Rose Family (ROSACEAE)

Meadowsweet (*Filipendula multijuga*)

Japanese and American species of meadowsweet are similar. Our meadowsweet grows 1 to 2½ feet high and displays showy panicles of white flowers in the summer.

Use: The odor is quite strong. In the North, however, after being boiled with ash and well soaked in water, the young tips are used in soups or salads, or they are fried.

Horticultural use: It is a popular garden plant, because of its showy flowers and graceful growth. Another Japanese meadowsweet (*F. purpurea*) is closely related to *F. multijuga*, but it has crimson flowers and purplish stems. Both have been grown in gardens since olden times.

Garden Burnet (*Sanguisorba officinalis*)

Unlike common, or small burnet (*S. minor*), and our Japanese species *S. obtusa* (*S. hakusanensis*), both of which have long cylindrical heads of flowers, garden burnet has a small globular head. Otherwise it is almost identical with common burnet.

Use: Young leaves, after bitterness has been removed by boiling lightly then dipping in cold water, are used for salads. The dried roots are used in various ways for the making of medicines. The name *Sanguisorba* means blood-stopper.

Horticultural use: Garden burnet is in great demand for flower arranging and is grown for that purpose. However, *S. obtusa*, *S. tenuifolia* vars. *alba* and *purpurea* and *S. albiglora* are more attractive as garden plants.

Culture and harvesting: The fresh young leaves are picked as they are wanted. Garden burnet is easily cultivated, but the plants growing in the mountains suffer from the dry summer heat.

Geranium Family (GERANIACEAE)

Geranium thunbergii

The spreading, perennial cranesbill is highly esteemed and used all over Japan as a folk remedy. The Japanese name GEN-NOSHOKO means "actual evidence."



Sanguisorba hakusanensis. Besides providing salads, this is a lovely garden plant and good for flower arranging.

Use: The dried foliage is used as an astringent and also as a digestive aid in many homes. People used to drink GEN-NOSHOKO tea regularly. The foliage is also sometimes used as a dye for turning gray to black, with iron as a mordant.

Horticultural use: With its pleasing growth and flowers, it makes a good herb garden denizen, but is not of much garden value otherwise.

Harvesting: Leaves are harvested and dried in the summer, when the plant is at its peak of growth.

Rue Family (RUTACEAE)

Prickly-ash (*Zanthoxylum piperitum*)

If a Japanese were planning a herb garden, surely this spiny, deciduous shrub would be among his first choices.

It is extremely hardy and is found in the wild in Japan, Korea and in the north of China. We grow a spineless variety, and we

have developed other cultivated varieties for use as culinary spices.

Use: The young leaves are used in soups and in many dishes. The fruits are either grated or preserved in soy sauce. They are also used as a medicine.

Horticultural use: Prickly-ash is of no particular garden value, but is widely grown for culinary purposes in home vegetable gardens.

Culture and harvesting: The common belief is that nursery plants offered on the market are sure to die. I cannot say whether this is true, the shrub does seem to have a capricious nature. The young leaves and fruits are picked as needed for spices.

Ginseng Family (ARALIACEAE)

Udo (*Aralia cordata*)

Years ago this bold-foliaged perennial herb was introduced into the United States from Japan. That great explorer David Fairchild tried UDO and proved it to be as tasty as any native vegetable. It is widely distributed in Japan, north China and Sakhalin, and we grow some cultivated varieties extensively.

Use: The mild, agreeable flavor of the young, asparagus-like shoots is refreshing, especially after blanching. Generally only the young shoots are blanched. They contain asparagin. Udo shoots are sliced and used in soups, vinegared foods and many other dishes.

Culture and harvesting: UDO likes rich, mellow soil. The bold clumps with their many thick, strong roots are dug out and moved to the blanching hut or frame where the beds are prepared and where the plants then produce white shoots in darkness.

In home gardens, after the foliage dies and is removed, a straw bag or bottomless box is placed over the clump. The bag or box is filled with chaff, straw, fallen leaves, dirt and the like. Udo is harvested just like asparagus.

Panax japonicus

When this aromatic perennial herb was first discovered, it so closely resembled the famous Asiatic ginseng that it was once called *Panax schinseng* var. *japonicus*.

Use: Unlike the upright, "human"-shaped root of Asiatic ginseng, the rootstock of *Panax japonicus* grows horizontally. It, too, is used as an aromatic tonic.

Horticultural use: With its handsome foliage and scarlet fruit, this herb makes a

good shady border in early autumn. It requires rich soil.

Harvesting: After several years, the rootstocks are harvested in autumn and dried.

Parsley Family (UMBELLIFERAE)

Angelica keiskei

This bold aromatic herb looks just like garden angelica (*A. archangelica*), but is a long-lived seacoast perennial. *Angelica keiskei* grows in the southern parts of Japan.

Use: Much like garden angelica, *A. keiskei* is used candied and in salads and condiments. *A. edulis*, a native of the northern mountainous regions, is similarly used. *A. ursina* is found in Hokkaido and on the mountains of northern Japan; its stems and leaf-stalks, stripped of bark, are frequently eaten. Different species are also occasionally used, while still others are avoided.

Horticultural use: This handsome plant makes a bold appearance. Its long life gives it an advantage over garden angelica, which sometimes behaves as a biennial.

Harvesting: Similar to that of garden angelica.

Cnidium officinale

Introduced from China, *Cnidium* has been extensively grown for medicinal purposes in Hokkaido and several parts of Japan. It has a fine compound leaf and a strong aromatic rootstock.

Use: For centuries, it has been an important sedative and painkiller.

Horticultural use: Though of no garden value, it is interesting enough to be included in herb gardens.

Culture and harvesting: Planted in the spring, the fattened roots are harvested in autumn. The rootstocks are steamed, then dried.

Japanese Wild Chervil (*Cryptotaenia japonica*)

This small perennial woodland plant bears pleasing, light green leaves which are divided into three leaflets: hence the Japanese name MITSUBA or "three-leaves." Some commercially cultivated varieties are grown extensively as herbs. It is so closely allied to the North American species that it was once considered as *C. canadensis* var. *japonica*. I fancy the American species has an equally pleasant flavor and would be liked in the United States.* (Footnote on next page.)



Glehnia littoralis. As a seaside dweller this species thrives in strong sun on sand dunes. Its long roots grow straight down deep into the sand.

Use: We Japanese are fond of MITSUBA's flavor and use it—either fresh or blanched—in soups, salads and vinegared and fried foods.

Horticultural use: From spring to summer it makes a delicate groundcover under trees or in shady places. It is quickly propagated from seed.

Culture and harvesting: Though traditionally sown in spring, nowadays in our climate seeds are sown all year round and the leaves are harvested in the young stages for market. From autumn to winter especially (but also during the other seasons), the plants are forced or blanched in specially prepared frames and huts. Leaves and leaf-stalks are picked as they are wanted.

Corkwing (*Glehnia littoralis*)

This vigorous perennial grows in sand dunes along the coast of the Pacific Ocean, from Taiwan, Ryukyu, Japan, Korea, China, Usuri and Kamchatka to the west coast of the United States. It is also known as *Phellopterus littoralis*.

The thick, glossy, dark green leaves spread out flat on the sand dunes. In summer, numerous small white flowers appear in umbels on a short stem and scatter great

quantities of seeds on the bare sand. The thick root grows straight down, deep into the sand. Though sand is easy to dig out with the hands, I have never yet succeeded in unearthing an entire root.

Use: The young leaves that lie on the sand are used to add flavor to vinegared dishes. The aromatic roots are sometimes put in bath water.

Horticultural use: Although it is handsome and impressive on sand dunes, I have not seen perfect specimens grown in gardens. I have tried to grow it with only a small measure of success, but it is worth trying where there is an abundance of sand.

Water Dropwort (*Oenanthe javanica*)

This perennial, flavorful herb grows and spreads by creeping stems in marshes and along streams. In autumn, young shoots sprout from the nodes and tips of the creepers; they are highly prized for cooking. Should you chance to be in the outskirts of Matsue, western Japan, in winter—particularly before New Year's—you would see many little flat-bottomed boats moving about in the shallow waters of *Oenanthe* or SERI plantations. The picking and cutting of young SERI shoots for shipment to Osaka,

* Because of the poisonous nature of many members of the parsley family (the Umbelliferae), it is dangerous to be the first to experiment with their edible properties. However, M. L. Fernald and A. C. Kinsey in "Edible Wild Plants of Eastern North America" say: "The discerning Swedish explorer, Pehr Kalm, who was sent to North America by his government . . . to discover useful plants, wrote in his journal of 1749 . . . that this plant 'abounds in the woods of all North America. The French . . . make use of it in spring, in clear soups, like chervil. It is universally praised here as a wholesome, anti-scorbutic plant, and as one of the best that can be had here in spring.' In "Using Wayside Plants" Nelson Coon writes of *Cryptotaenia canadensis*, which he calls honewort: "Generally throughout our territory, it is useful in the late spring or summer as a potherb. . . . It may well be that it has a certain value as a source of vitamins and minerals."

Kyoto and many other cities is an annual winter sight in Japan. SERI grows from Hokkaido, northernmost Japan, to Queensland, Australia, in the far south.

Use: Though it is picked and used year round, it is at its best from autumn to early spring. It is one of the best greens for SUKIYAKI in winter. The finely chopped leaves add flavor to soups, salads and chicken. The slender white roots grow about 1 foot long in the water, and the prettiest of these are highly esteemed for cooking.

Horticultural use: Some cultivated varieties are recognized and grown commercially. In the winter the fresh plants are a lovely sight in water-lily ponds, both in and out of the water. Unless special care is taken, however, SERI will soon occupy the entire pond.

Culture: The stem is cut into small pieces. One end of the cutting is simply placed in soil.

Gentian Family) (GENTIANACEAE)

Sweetia japonica

This slender biennial herb reaches a height of 8 to 10 inches. It has small linear leaves and in the autumn bears small white flowers striped with purple. The Japanese name SENBURI means "one thousand decoctions." It is said that even after the dried plants have been boiled a thousand times, they are still bitter. The live plant also has the reputation of being the most bitter of Japanese plants.

Use: It is widely valued as a stomach tonic.

Horticultural use: Like gentians, it is very difficult to acclimatize in gardens.

Mint Family (LABIATAE)

Japanese Field Mint (*Mentha arvensis* var. *piperascens*)

This is an important Japanese herb for export as well as home use. It resembles peppermint and spearmint.

Use: Dried leaves are used in making medicine. The plant oils are used in making candies, drinks, medicines and dentifrices. It is considered the best of all mints for making menthol.

Horticultural use: It is not of much garden value, but if you are a real herb enthusiast, my advice would be to secure the best cultivated varieties of field mint—those with a good yield and good quality oil. You will have a long search, I assure you! Merely the sight of those cultivated varieties in one's garden, with their great variety of color and shape, should offer much pleasure.

Culture: Japanese field mint is most extensively cultivated in Hokkaido. Like other mints, it grows best in rich, moist soil—actually black muck soil. The rootstocks are divided and planted so that they won't wither in early spring.

Harvesting: The plants are harvested at the peak of growth, when they begin to bloom. In a favorable climate there are two or three harvests a year.

Purple Perilla (*Perilla frutescens* var. *crispa*)

This annual herb grows to 2 or more feet.

Perilla frutescens var. *crispa*. Young flowering spikes are used in tempura.



its dark purple, fringed leaves with their cinnamon-like scent are reminiscent of the colorful leaves of coleus.

Use: There are two kinds of perilla, the dark purple-leaved and the green-leaved cultivars. The less harsh green-leaved cultivated variety is used in salads. The purple-leaved plant is mostly used to give Japanese pickled apricots their scarlet color. The flower spikes of both varieties as the flowers fade and seeds begin to form—go into soups; spikes in the more advanced stages are fried. The seeds are often preserved in salt. The leaves, seeds and stems are used in making medicine.

Horticultural use: When as a young man I studied at England's Kew Gardens, I was surprised to find perilla—used solely for culinary purposes in Japan—liberally planted in parks in subtropical beds with young eucalyptus and oramental garden plants.

Some years ago when I sent perilla seeds to an American lady who is a herb enthusiast, I was pleasantly surprised to learn that she had never heard of perilla's culinary uses.

Culture: Purple perilla is one of the easiest annuals to cultivate in any soil. It may soon become self-sown annually.

Harvesting: The leaves are picked as needed. The seeding spikes should be cut and used at the right time; you will come to know when this is after some experience with them.

Japanese Thyme (*Thymus quinquecostatus*)

It closely resembles common thyme (*T. vulgaris*), but with slightly longer leaves and purple-tinged foliage. Its use, culture and harvesting are the same as for common thyme. That is, its leaves, either fresh or dried, are used for seasoning soups and meat dishes. Its culture, as a small, slightly woody plant, makes no special demands on the grower.

Nightshade Family (SOLANACEAE)

Chinese Wolfberry (*Lycium chinense*)

This rambling, deciduous shrub has long been known in western gardens and was revealed to the Orient in ancient herb books. For the past 15 or more years, Chinese wolfberry has provided a popular tonic, tonic tea and wine to all parts of Japan.

Use: From remotest times, the dried leaves, fruit and root-bark have been valued

as a medicine. The young leaves can be used in salads, boiled with rice or prepared as a tonic tea.

Horticultural use: It is a splendid sight in autumn gardens, when its slender branches are laden with scarlet berries. Potted bonsai of abundantly fruited *Lycium* plants are a common sight in plant auctions and nurseries all over Japan.

Culture: It grows somewhat untidily in any kind of soil.

Figwort Family (SCROPHULARIACEAE)

Veronicastrum sibiricum

This herb was once considered a variety of the American Culver's-root (*V. virginicum*) which is found in the eastern United States. It grows about 3 feet high, with leaves in whorls of three to eight. Racemes of purple-blue flowers appear in summer.

Use: After the bitterness has been reduced by dipping in boiling water, the young leaves are used as a salad. Dried stem roots are a folk remedy for rheumatism.

Horticultural use: Its whorled leaves and lovely racemose flowers (prettiest in the darker shades) make *Veronicastrum* a good garden plant.

Culture: It grows in well-drained soil in full sun.

Madder Family (RUBIACEAE)

Rubia akane

This perennial trails along the ground as it grows. It bears small oval leaves in whorls of four at each node. Small white flowers appear in flat-topped clusters in the autumn.

Use: In olden times the roots were used to make red dye, just like those of common madder (*Rubia tinctorum*), and they are still used today by some dye craftsmen. The dried roots are made into a medicine for reducing fever and arresting hemorrhage.

Horticultural use: It is of little use except for its historical interest.

Harvesting: Several years after planting the roots are dug out and dried for medicinal purposes.

Valerian Family (VALERIANACEAE)

Valeriana fauriei

This perennial, 1 to 2 feet high, grows in mountainous regions. The leaves are pin-nate; the pink flowers cluster in spikes.

Use: The roots have better sedative properties than those of the common European



Veronicastrum sibiricum is related to Culver's root of eastern United States.

species (*Valeriana officinalis*). They are used for the cure of nervous diseases and are considered especially effective for hysteria.

Horticultural use: Its lovely flowers make this a good garden plant.

Culture and harvesting: The seeds are sown in early autumn, or the plant can be propagated by divisions. When it flowers, it should be cut back several inches to encourage the growth of the roots, which are harvested in late summer.

Bellflower Family (CAMPANULACEAE)

Balloon-flower (*Platycodon grandiflorum*)

Most gardeners are well acquainted with Japanese bellflower or balloon-flower. Reaching a height of 1 to 3 feet, this thick-rooted perennial bears numerous ovate-lanceolate leaves and large, five-lobed purplish-blue flowers.

Use: The long roots, although they contain poisonous saponin, are highly esteemed in the production of a cough remedy. It is said that the slightly boiled young foliage is eaten as a salad in the mountainous regions.

Horticultural use: Where good drainage is provided, this plant makes handsome flower borders.

Culture: Flowers appear a year after planting. It takes several more years to obtain roots for making medicine.

Composite Family (COMPOSITAE) Siberian Yarrow (*Achillea sibirica*)

This herb grows from Japan through the Aleutians to North America and is closely allied to common yarrow (*Achillea millefolium*). It reaches a height of 2 to 3 feet, with feathery, pinnate leaves. From July to September minute white flowers appear in flat heads.

Use: The aromatic plants are used as a stomach tonic.

Horticultural use: Varieties with purplish-pink flowers are more desirable for gardens and flower arranging.

Culture: With its usual vigor, it grows in any soil and is easily propagated by division.

Japanese Mugwort (*Artemisia princeps*)

This perennial Japanese weed is underfoot everywhere. It is closely allied to North American and European mugwort (*Artemisia vulgaris*). It grows 2 to 4 feet high, with silken, gray-lobed leaves and minute flowers of a yellowish-brown color.

Use: Any country-bred Japanese will feel nostalgia for Japanese mugwort rice dumpling, with its delightful color and aroma. After being slightly boiled, the young leaves are pounded into the rice dumpling.

The young leaves are also used in soups



Aster yomena. The aromatic young leaves of this aster may be eaten slightly boiled, as fried greens, or in salads. Like many wild asters of the New England States, it is a lovely perennial in gardens as well as in the fields.

and salads after their bitterness has been removed. Artemisia tea is also occasionally prepared.

In addition to their many other medicinal uses, dried artemisia leaves are used in the manufacture of moxa, a cauterizing agent and counter-irritant. *A. capillaris* is also used medicinally, while *A. japonica* is a common culinary herb.

Horticultural use: Having no garden value, this plant should not be admitted to the herb garden, for, with its stoloniferous roots, it will soon over-run everything.

Harvesting: Young leaves are picked as needed for culinary purposes; the older leaves are made into medicines.

Aster yomena

This species is a common sight in rice fields and elsewhere in very moist soil. Like those in the United States, however, our asters are difficult to identify and often confuse even botanists. Thus, when I speak of *A. yomena*, it is in a broad sense, since other species may be included in the same category.

Aster yomena grows 1 to 2 feet high, with lanceolate leaves and daisy-like purple-blue flowers.

Use: After being slightly boiled, the aro-

matic young leaves are used in salads or as fried greens.

Horticultural use: *Aster yomena* grows in the moist corners of gardens, where its stoloniferous roots soon invade everything.

Cooking Chrysanthemums (*Chrysanthemum* varieties)

For centuries in Aomori prefecture and in other northern regions, a species of chrysanthemum has been developed for culinary purposes. Many florists' chrysanthemums do just as well for cooking. Whether you try the cooking or florists' variety of chrysanthemum, you should have no difficulty appreciating its delightful fragrance and flavor. When I introduced to my garden ABOKYU, a popular cultivated variety of chrysanthemum, I found myself enchanted with its history.

Messrs. K. Ueda, S. Hamada and Dr. O. Suzuka discuss the cooking chrysanthemum in greater detail in earlier pages.

Cirsium dipsacolepis

This one of sixty species of our native thistle is raised commercially for its flavor. *Cirsium dipsacolepis* grows on the plains of Honshu, Shikoku and Kyushu. It reaches a height of 2 or 3 feet, bearing pale lavender

thistle-heads in early autumn. Its stature is not unlike that of the common thistle.

Use: The spindle-shaped roots grow 8 or 9 inches long and are three-quarters of an inch in diameter. They are preserved in SAKE lees or bean paste and used after a time. They can also be eaten boiled, or sliced and fried to bring out their strong, agreeable flavor. The thick roots of fragrant thistle (*C. purpuratum*) and *C. maritimum* are also eaten.

Horticultural use: FUJI or fragrant thistle (*C. purpuratum*), with its larger and showier heads, looks best on the gravelly, sunny slope of a rock garden.

Silveredge (*Farfugium japonicum*, or *Ligularia kaempferi*)

A blotch-leaved variety called leopard-plant was once common in conservatories in western countries. Our evergreen perennial has glossy, thick, roundish leaves which attain a diameter of 1 foot. From late autumn until the end of the year, lovely yellow flower heads appear far above the leaves.

Use: After the harsh taste is first drawn out by boiling in water, and the bark removed, the leaf-stalks are used to add flavor to salads and other dishes. It is used much less in cooking than sweet coltsfoot (*Petasites japonicus*), except in some cold regions where it is predominantly used.

Horticultural use: A keen observer of Japanese gardens will notice *Farfugium* occupying a shady corner, nestled near rocks or under the heavy shade of trees. Indeed, it is a tidy, lovable growth wherever found. It

Farfugium japonicum is a good evergreen perennial herb for a shady corner. A blotched-leaved variety is known to gardeners in the Occident as leopard-plant.



The flower heads of *Petasites japonica* are a welcome harbinger of spring in gardens and their bitter flavor is agreeable in cooking to the folk of Japan.

prefers a shady place in rich, mellow soil.

Harvesting: Leaf-stalks are cut off when fully grown, and after the bark is removed they are boiled in water and kept for use when needed.

Velvet-plant (*Gynura bicolor*)

This purple-leaved native of the Molucca Islands was grown and esteemed as a culinary herb in ancient times, but now is rarely seen. It reaches a height of 1 or 2 feet, with lance-ovate leaves.

Use: The succulent foliage is eaten flavored with a sauce of SAKE, soy sauce and vinegar. Since olden times, *G. japonica* has been considered a sovereign remedy for goldfish diseases, and is still used as a medicine today.

Horticultural use: Because of its lovely yellow flowers, it is a popular garden plant.

Sweet Coltsfoot (*Petasites japonicus*)

This perennial herb grows in the wild in damp, mountainous places from Honshu south to Shikoku and Kyushu. It is also commonly grown in home gardens and extensively raised for the market.

Its large, light green leaves are borne on leaf-stalks 1 or 2 feet long. The leaf-stalks have an agreeable flavor. Long before the leaves appear, in the midst of winter, large, round chartreuse flower-heads emerge close to the ground. The unopened flower heads are esteemed for their bitter though agreeable flavor.

It is a deciduous herb, unlike *Farfugium*

japonicum and winter-heliotrope (*Petasites fragrans*) of the Mediterranean region.

Use: The leaf-stalks are first placed in boiling water, then in cold water. The bark is peeled, and the leaf-stalks are ready to be used either as seasoning or an entire dish in themselves. They can also be preserved with salt, sugar or rice-bran. After the unopened flower-heads are treated first to boiling then cold water, they are served with or without soy-bean paste. They are also used to make medicines.

Horticultural use: Sweet coltsfoot spreads vigorously with underground runners and makes a good covering for shady or waste places. The flower-heads are a welcome harbinger of spring to gardens. I still keep an old cultivated variety with purplish flower-heads and leaves in my garden. The purple color is lost in cooking, but it still makes a nice garden plant.

Culture: A slightly moist, rich and mellow soil in a shady spot is best. The underground runners are divided and planted shallowly at intervals. It takes time to raise it from seed. Commercial growers force the runners to bear softer and longer leaf-

stalks. There are some good cultivated varieties for culinary purposes.

Harvesting: Younger leaf-stalks are preferably cut off as needed. The flower-heads are used only when they have just come out and are still firm.

Petasites japonicus* var. *giganteus

This is a bold, giant-sized variety of sweet coltsfoot (*Petasites japonicus*). It grows in the wild from northernmost Honshu to Hokkaido and far into Sakhalin and the Kurile islands. Mr. Ohyama's article and photographs will give some idea of its great size and stature.

I have before me a booklet published several decades ago by the Society of *Petasites japonicus* var. *giganteus*, which discusses everything pertaining to this herb. I was surprised to learn of its many uses—from marking walking sticks to baking cakes!

I hope the reader will find many uses for the Japanese herbs so briefly described in these pages. And I hope the herbs will be successfully adapted to new and congenial surroundings. ♦



The fragrant flowers of Mioga ginger have many culinary uses, including tempura.

RECIPES

*Prepared in collaboration with Miss Michi Yamaguchi, Cornelius Ackerson
and Peter K. Nelson*

Sources of Ingredients

Obtaining some of the ingredients used in Japanese cookery can be a problem for many American cooks. Mr. Ackerson mentions that he is fortunate in being able to obtain most of them from the Pagoda Gift Shop, Airport Plaza, Hazlet, New Jersey 07735. The Japan Food Corporation has offices in New York City, Chicago and San Francisco. Although they are wholesale dealers only, they can supply the names of local retailers. Addresses of Japan Food Corporation offices are:

In Chicago: 1850 West 43rd Street, Chicago, Illinois 60609; in New York: 11-31 31st Avenue, Long Island City, N. Y. 11106; in San Francisco: P. O. Box 3220, San Francisco, California 94119.

In New York City the Japanese Foodland at 2620 Broadway and the Japan Mart, 239 West 10th Street, are sources of supply.

Many of the ingredients in Japanese cooking, *e.g.*, water chestnuts, bamboo shoots and dried mushrooms, are also important in Chinese cuisine and can be obtained from stores in the Chinese neighborhoods of many large cities.

Rice

Rice cooked in the Japanese style tends to be somewhat sticky, so it can more readily be handled with chopsticks. In this respect Japanese cooking differs from Chinese, which produces flaky rice, with the grains distinctly separated from one another.

For Japanese style rice, wash it thoroughly in water, then soak for about 30 minutes. Drain. In cooking, the amount of water used depends on the desired softness of the rice. Two and a half to three times as much water as rice can be tried as a starter. Cover the pan, bring water to a boil, and then simmer until water is absorbed.

Dried Seaweed

Nori (dried seaweed) comes in a package of 10 8-inch square pieces and is prepared as follows (Japanese style):

With a whisk made of long-needle pine dipped in sesame oil, lightly brush each side and sprinkle with Accent (monosodium glutamate). Then toast the seaweed over a charcoal hibachi until it is crisp. It can be eaten as is, or cut into thin strips and used in soups and various dishes such as sukiyaki.

Ackerson

Teriyaki

1. Cut tip sirloin or London broil steak into bacon-thin slices. Allow 8 to 10 slices per person.

2. Purchase the largest size mushrooms available and slice them parallel to the stem (vertically) into $\frac{1}{4}$ -inch slices. Place the slices evenly over a low oblong baking pan, add sesame oil or Wesson (or other) oil—about 1 tablespoon per mushroom, add Accent, then bake to a light brown color. Use two large mushrooms per person.

3. Cut water chestnuts into three or four $\frac{1}{4}$ -inch slices, using one 5-ounce can for each four servings. (These can be found in the Chinese food departments of many supermarkets.)

4. Put 4 tablespoons of sesame oil (or other cooking oil) in a cast iron pot which has a lid and bring it to the point of smoking. Then add the slices of meat and cook on each side for only a few seconds, until brown on both sides. (When there are many slices I cook as directed and transfer batches of cooked meat to the inside of the pot lid until all the slices are browned.)

5. Place meat, mushrooms and water chestnuts in the pot, add $\frac{1}{2}$ cup of Teriyaki sauce (now available in many grocery stores), or 4 tablespoons of soy sauce and $\frac{1}{2}$ cup of sherry wine.

6. Add 1 can of cream of mushroom soup (undiluted) for each 4 servings.

7. Heat until ready to serve (less than 5 minutes over a low flame).

I can buy the baked mushrooms ready to add, so with the meat sliced in advance, the whole recipe can be put together and ready to serve in 15 minutes. (I often add toasted Nori, but when people ask "What is this black stuff?" and I tell them it is seaweed, they act as though they are eating baked rattlesnake!)

Ackerson

Sukiyaki

1. Cut meat as indicated in 1 above, allowing 6 to 8 slices per person. Cook as directed in 4 above.

2. Cut two stalks of celery diagonally into $\frac{1}{2}$ -inch pieces for each person.

3. Slice one onion per person into crescent segments $\frac{1}{4}$ -inch wide at center of crescent.

4. Prepare water chestnuts as in 3 for teriyaki.

5. Place all ingredients in the pot and $\frac{1}{2}$ cup of Kikkoman sauce (available at most grocery stores), or use 4 tablespoons of soy sauce and $\frac{1}{2}$ cup of sherry wine.

6. Simmer until the celery is partially cooked but still crisp.

7. Arrange attractively on serving plates.

There are many other ingredients such as bamboo shoots and lotus root (water chestnut is a substitute) which I can get and do use in cooking, but the American cook who cannot find them would lose interest in preparing Japanese dishes. I can assure you that the two recipes above are delicious and close enough to the dishes I have eaten in Japan to be served as authentic Japanese.

Ackerson

Sukiyaki (alternate recipe)

- 2 tablespoons fat
- 2 pounds beef, pork, or chicken cut in bacon-thin slices or strips
- 2 onions, thinly sliced
- 2 or 3 green onions, sliced
- $\frac{1}{2}$ cup mushrooms, sliced
- 1 cup bamboo sprouts
- $\frac{1}{2}$ cup diluted shoyu sauce (dilute with beef or chicken broth)
- 2 tablespoons sugar
- 1 cake tofu (soybean curd) cut in cubes (optional)

Place fat in skillet and add meat strips. Simmer about 5 minutes. Add onions, mushrooms, bamboo sprouts, shoyu sauce and sugar. Cook 10 minutes. Add bean curd if desired. Serve hot with rice.

Kiuri-no-sunomo-no

- 2 cucumbers, peeled
- 1 cup chopped raw fish
- $\frac{1}{2}$ cup vinegar
- $\frac{1}{4}$ cup shoyu
- 2 teaspoons sugar

Cut cucumbers through the center, remove seeds and slice very thin. Soak the chopped fish in vinegar, shoyu and sugar. Pour sauce over the cucumbers.

A variation of this which may be more pleasing to American palates uses tiny canned shrimp in place of the raw fish. For an attractive festive relish prepare as follows:

Cut a long, unpeeled cucumber in two, crosswise, then cut the halves in two again, this time lengthwise. Trim the ends and the sides so the pieces are rectangular. Holding each piece with the rind side up, cut lengthwise into thin slices, but do not quite cut through at one end. The pieces are left joined by about $\frac{1}{2}$ -inch at this end, but can be fanned open at the other end. Insert the small shrimp between the fanned-out slices and pour the sauce over the whole. Serve cold.

Vinegar-sesame Sauce for Vegetables

- $\frac{1}{2}$ cup white sesame seeds
- 2 tablespoons sugar
- 2 tablespoons shoyu
- 2 tablespoons vinegar

Brown the sesame seeds in a frying pan. Crush. Add seeds to sugar, shoyu and vinegar. Mix this sauce with any raw green vegetables.

Shoyu Steak

- 1 pound round steak
- $\frac{1}{2}$ cup shoyu
- 1 piece ginger root
- $\frac{1}{4}$ cup flour (more if needed)
- 2 tablespoons fat
- 1 onion (sliced)

Cut meat into small pieces for serving. Soak for one hour in shoyu and ginger (crushed). Drain, roll in flour and brown in fat. Add the sliced onion and cook until browned. Remove meat and make gravy, using shoyu as part of the liquid.

Fried Herbs (Tempura)

Leaves of *Perilla frutescens* var. *crispa*
Young leaves of chrysanthemum
Young roots of *Zingiber officinale* (common ginger)
Young blossom shoots of *Zingiber mioga* (Mioga ginger)

Coating for Tempura

1 egg
1 cup water
1.3 to 1.5 cups flour

Lightly mix ingredients together. The oil should be rice oil, salad oil or soybean oil—that is vegetable oil. Heat until very hot, between 300-350°F. Reverse sides *only* of perilla and chrysanthemum leaves are dipped in the batter and fried very quickly until crisp.

The ginger roots, with a small section of stalk attached, are cut lengthwise. Dip the stalks in batter and fry. Shoots of Mioga ginger are also sliced lengthwise, dipped in batter and fried.

These herbs are added to shrimp or fish tempura dishes and eaten with salt or shoyu (soy sauce).

Yamaguchi

Cucumber Pickle

5 cucumbers (Japanese type—long and slender)
30 leaves of *Perilla frutescens* var. *crispa*
15 "Sweetbell" red peppers (*Capsicum annuum* var. *grossum*)
Salt

Remove seeds and soft parts of cucumbers. Slice off the thick veins of perilla leaves and sprinkle with salt. Remove seeds from peppers. Wrap the peppers in perilla leaves and stuff the cucumbers with them. Sprinkle the cucumbers with salt and place a weight on them for 2 or 3 days. Wash lightly and cut into ¼-inch pieces before eating.

Yamaguchi

Instant Pickle of Eggplant and Mioga Ginger

2 or 3 eggplants (Japanese type—thinner and longer than the regular type, often somewhat crescent shaped)
2 or 3 young shoots of Mioga ginger
Salt
Shoyu
Mustard paste

Cut the eggplants lengthwise into quarters and then into small cubes. The ginger is also sliced lengthwise. Mix both, sprinkle with salt and squeeze together. Discard the juice. This pickle is eaten with shoyu to which is added a little mustard paste.

Instant Pickle

Cabbage

Leaves of *Perilla frutescens* var. *crispa*
Young roots of *Zingiber officinale* (common ginger)

The cabbage, perilla leaves and ginger roots should be sliced thin and mixed together. Squeeze gently, gradually sprinkling with salt. Discard the juice. Eat with shoyu and a little Ajinomoto (monosodium glutamate or Accent).

Yamaguchi

Herbs used for Salads

Zingiber mioga (Mioga ginger) blossom sprouts
Aralia cordata (udo) forced young sprouts
Zingiber officinale (common ginger) young roots

Allium ledebourianum (Ledebour onion)
Chrysanthemum blossoms (white or yellow)

One or two kinds of these herbs are sliced thin and mixed with vegetable salad, with French dressing.

Allium ledebourianum is chopped and scattered over the top of the salad, like parsley.

Yamaguchi

Salt Cherry Blossom Pickle

Buds of double-flowering cherry blossoms (just about to open) about 1 pound
Salt (coarse) about ½ pound
Burnt alum pinch

Sprinkle salt mixed with burnt alum on 1¼-inch layer of cherry blossoms. Add another layer of blossoms, salt, and so on, until blossoms are used up. On the last layer use much more salt than on the other layers. Place a weight on the mixture and when liquid rises in the container, squeeze out and discard. Sprinkle blossoms with table salt, then spread out in the air until dry. Store in a jar.

Put two or three blossoms in a teacup and add hot water. The blossoms open in the cup and may be eaten while drinking the hot cherry blossom "tea."

In Japan this pickle is used on auspicious occasions, such as weddings.

Yamaouchi

Pickles of *Allium bakeri*

A. Fundamental treatment

Allium bakeri 8.8 pounds

Salt about 1 pound

Water 8.8 pounds

Add *Allium* roots that have been washed and trimmed at both ends to the salt and water. Add a weight that will give 8.8 pounds of pressure and keep for a week. Remove the roots from the salted water and dry in the sun.

B. Vinegar treatment

1 cup vinegar

Salt about 1½ tablespoons

Add vinegar to the salt. The dried allium roots, in an air-tight container, may be kept in the solution as long as desired.

C. Finishing treatment

1 or 2 peppers

Vinegar 6 tablespoons

"Mirin" (flavored sake) 1-2/5 cups

Sugar ½ ounce (about 1 heaping tablespoon)

Remove seeds from peppers, wash and slice them. Boil the vinegar and add "Mirin." Cool the mixture and add sugar and peppers. Place the *Allium* roots in the solution as it cools and store in jars. The pickled roots will be ready to eat after the liquid has penetrated them thoroughly.

Yamaouchi

Chicken Brochettes spiced with Ginger

Chicken meat (about ½ pound)

1 chicken liver

2 *Allium fistulosum* (Welsh onions)

1 old ginger root

½ cup shoyu

The sauce is prepared by adding grated ginger to the shoyu. Cut the chicken, liver and onion into bite-size pieces and place them alternately on long bamboo skewers. The spitted pieces are dipped in the sauce and roasted over charcoal or a gas flame until browned. Baste occasionally with the sauce.

Yamaouchi



Just as final page proof was about to go to our printer, we received four books on Japanese cookery from a friend in Tokyo. We are unable to include here any of the recipes for Japan's famous dishes but all four books are available in this country and can be ordered direct from the addresses given below.

"Cook Japanese," by Masaru Doi. Tokyo, Japan. Kodansha International, Ltd. 1st English edition, 1964; 4th printing, 1968. 128p. (Kodansha International/USA, Ltd., 577 College Avenue, Palo Alto, California 94306.)

This is a beautifully illustrated "Picture Card Series" volume with simple, easy-to-follow recipes that have been selected by the author for their appeal to Western tastes. All of the ingredients or adequate substitutes can be found in the United States. A glossary defines terms used in the book. The loose-leaf binding permits recipe cards to be re-

moved for convenience in following directions.

"Japanese One-pot Cookery; Friendly and Festive," by Masaru Doi. Tokyo, Japan. Kodansha International, Ltd. 1st edition, 1966. 109p.

Bound and illustrated in the same style as "Cook Japanese." There is a section on choice of utensils, with illustrations; cooking hints; basic recipes for sauces, soup stock, spices and dips, etc.; also a glossary.

Two paperbacks compiled by Japanese Cooking Companions and published by Japan Publications Trading Company (175 Fifth Avenue, New York, N. Y. 10010; P. O. Box 7752 Rineon Annex, 1255 Howard Street, San Francisco, Calif. 94103) 1968. These contain line drawings illustrating methods of preparation.

"Tempura and Sukiyaki." 60 recipes. 56p.

"Teriyaki and Sushi." 72 recipes. 58p. ♦

SUMMARY OF HERBS MENTIONED IN THE HANDBOOK*

Plant name	Common names in English & Japanese	Author & page No.	Part of plant	Use	
				Culinary	Medicinal
<i>Acanthopanax spinosus</i>	— YAMA-UKOGI; ONI-UKOGI	Kato p. 18	leaves	after boil with prickly-ash leaves, used in salads	
<i>Achillea sibirica</i>	Siberian yarrow NOKOGIRI-SO	Yashiroda p. 55	—	—	stomach tonic
<i>Acorus calamus</i>	sweet flag SHŌBU	Yashiroda p. 44	leaves	—	for aromatic bath on festival day
<i>Adonis amurensis</i>	Amur adonis FUKUJU-SŌ	Hano p. 39	root-stocks roots	— —	medicine heart medicine
<i>Allium chinense</i>	Onion family RAKKYŌ	Yashiroda p. 45	bulbs	either pickled in vinegar, with sugar, honey or soy sauce or: preserved in salt, with lees or sweet SAKE	—
<i>Allium fistulosum</i>	Welsh or Spanish onion NEGI	Yashiroda p. 45	blanched stems & crowns green leaves	esp. winter & fall in SUKIYAKI SUKIYAKI—many other dishes	— —
<i>Allium grayi</i>	— NO-BIRU	Makihara p. 15 Yashiroda p. 46 Ohyama p. 58 Suzuka p. 9	bulb	cooked alone eaten with soy bean paste a dressing for vinegared bean cake	— —
<i>Allium monanthum</i>	HIME-NIRA (HIME-BIRU, HIME-AMANA)	Hano p. 38 Kato p. 19	young leaves	after naturally blanched coming up through snow herb	folk medicine
<i>Allium sativum</i> var. <i>japonicum</i>	related to garlic cv.	Yashiroda p. 46	—	used like garlic	—
<i>Allium schoenoprasum</i> var. <i>foliosum</i>	chives EZO-NEGI	Yashiroda p. 46 Kato p. 19 Suzuka p. 9	—	herb & vegetable	—
<i>Allium tuberosum</i>	— NIRA	Yashiroda p. 46 Suzuka p. 9 Hano p. 38	— flower-heads seeds	stewed & pickled it adds flavor to soups & rice porridge eaten salted —	— medicine

* Plants in Mr. Shimada's article are of historical rather than culinary or medicinal interest and are therefore omitted from the summary.

Plant name	Common names in English & Japanese	Author & page No.	Part of plant	Use	
				Culinary	Medicinal
<i>Allium victorialis</i> var. <i>platyphyllum</i>	— GYŌJA-NINNIKU	Kato p. 19 Suzuka p. 9	—	herb & vegetable	—
<i>Alpinia</i> sp.	Ginger Family	Yashiroda p. 46	seeds	—	aromatic digestive aid
(<i>A. formosana</i>)	KUMATAKE-RAN		leaves	—	—
<i>A. intermedia</i>	AO-NO-KUMATAKE-RAN				
<i>A. japonica</i>	HANA-MYŌGA				
<i>A. speciosa</i>)	GETTŌ				
<i>Anemarrhena asphodeloides</i>	— HANA-SUGE	Yashiroda p. 46 Suzuka	rhizomes	—	medicine
<i>Angelica acutilobum</i>	— TOKI	Suzuka p. 10	—	—	celery-flavored tonic, esp. for ladies
<i>Angelica anomala</i>	— EZO-NO-YOROI-GUSA	Suzuka p. 13	roots	—	fever-reducer, pain-reliever
<i>Angelica edulis</i>	— AMA-NYU	Yashiroda p. 51	—	candied, in salads, as condiment	—
<i>Angelica keiskei</i>	— ASHITABA	Yashiroda p. 51	—	candied, in salads, as condiment	—
<i>Angelica ursina</i>	— EZO-NYU	Yashiroda p. 51	bark-stripped stems & leaf-stalks	boiled, then dried or salted for immediate or future use, or can be eaten fresh	—
<i>Anthriscus sylvestris</i>	woodland chervil SHAKU; KOJAKU	Kato p. 22	—	pot herb	—
<i>Aralia cordata</i>	UDO	Yashiroda p. 44, 58 Ohyama p. 58	young shoots	blanched and sliced for use in soups, vinegared dishes	—
<i>Aralia elata</i>	Japanese angelica tree TARA-NO-KI	Kato p. 18	leaves	used in salads after boiling with prickly-ash leaves	—
<i>Artemisia princeps</i>	wormwood or mugwort YOMOGI	Kato p. 19 Yashiroda p. 55 Tagaki p. 43	young leaves	mugwort dumpling; also used in soups & salads	—
			dried leaves	—	used in making MOXA, a counter-irritant
<i>Aster yomena</i>	— YOMENA	Yashiroda p. 56	young leaves	after brief boil, fried or used in salads	—
<i>Atractylodes japonica</i>	— OKERA or SADO-SOOZYUTH	Suzuka p. 13	—	—	for stomach ailments
<i>Brasenia schreberi</i>	water-shield JUNSAI	Kato p. 19 Yashiroda p. 47	young leaf tips	used in soups, eaten flavored with SAKÉ, soy sauce & vinegar, or dressed with vinegared bean cake	—

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<i>Macalía delphiniifolia</i>	— MOMIJIGASA	Kato p. 19 Ohyama p. 58	leaves young leaves	salads, soups, boiled greens eaten freshly chopped, or treated with soy bean paste	—
<i>Macalía hastata</i> var. <i>tanakae</i>	— INU-DŌNA	Ohyama p. 58	young leaves	eaten freshly chopped or with soybean paste	—
<i>Cassia tora</i>	sickle senna EBISU-GUSA	Kato p. 19 Suzuka p. 13	seeds	—	tonic, laxative, medicinal tea
<i>Chenopodium album</i> var. <i>centrorubrum</i>	lamb's-quarters AKAZA	Yashiroda p. 47	young leaves & tips	eaten in salads or fried in oil after brief boil	
<i>Chrysanthemum</i> p.	cooking chrysanthemum	Ueda p. 23 Yashiroda p. 56	florets	TEMPURA: coated with flour & fried in oil NAMASU of fish salad—boiled, seasoned with soy sauce, vinegar & sugar to garnish sliced, raw fish	—
<i>C. morifolium</i>	SHOKOYU-GIKU	Suzuka p. 7	—	SALAD: florets boiled, seasoned with soy sauce & sugar—served with bean curd or chopped sesame seeds, soup; pickles; KIKUMI—boiled, marinated in SAKE, blended with soy sauce & pickled apricots	
<i>Cirsium amplexifolium</i>	species of thistle DAKIBA-HIME-AZAMI	Kato p. 19	—	popular "mountain vegetable" in N. Japan	—
<i>Cirsium buergeri</i>	HIME-AZAMI or HIME-YAMA-AZAMI	Kato p. 19	—	popular "mountain vegetable" in N. Japan	—
<i>Cirsium dipsacolepis</i>	MORI-AZAMI	Yashiroda p. 56	roots	preserved in SAKE lees & bean paste	—
<i>Citrus junos</i>	evergreen orange HANAYUZU or UZU	Makihara p. 15	rind	sliced or ground	
<i>Cnidium officinale</i>	— SENKYU	Yashiroda p. 51 Suzuka p. 10	roots	—	blanched in hot water then dried, for a sedative, painkiller & tonic
<i>Cotix lacrymabii</i> var. <i>mayeun</i>	Job's-tears HATO-MUGI	Suzuka p. 10 Takagi p. 43	grains		boiled and drunk as cure for warts on hands & feet also diuretic & painkiller

Plant name	Common names in English & Japanese	Author & page No.	Part of plant	Use	
				Culinary	Medicinal
<i>Commelina communis</i>	day-flower TSUYU-KUSA	Hisaoka p. 41	dried foliage	—	extract for sore throat relief for empty stomach when combined with plantain foliage & some sugar
<i>Coptis japonica</i>	goldthread O-REN; WO-REN or OH-REN	Yashiroda p. 48 Suzuka p. 11	roots	—	folk medicine for stomach & intestinal ailments
<i>Cryptotaenia japonica</i>	Japanese wild chervil MITSUBA	Yashiroda p. 51 Ohyama, p. 58 Suzuka p. 9	leaf-stalks	either fresh or blanched—in soups, salads, vinegared & fried food	—
<i>Elatostema umbellatum</i> var. <i>majus</i>	nettle relative UWABAMI-SŌ	Kato p. 19	leaf stalks	pot herb	—
<i>E. laetevirens</i>	YAMA-TOKIHOKORI	Kato p. 19	—	used in kitchen	—
<i>Epimedium grandiflorum</i>	longspur IKARI-SŌ	Suzuka p. 11	entire plant	—	dried & steamed or preserved in SAKE as a tonic
<i>Equisetum arvense</i>	horsetail SUGINA	Kato p. 22	very young spore-bearing shoots	popular pot herb	—
<i>Farfugium japonicum</i> and <i>F. j.</i> cultivars	silveredge; leopard-plant TSUWABUKI	Yashiroda p. 57 Yamaguchi p. 40	leaf-stalks	boiled in water to remove harsh taste—then used in salads, etc. used like sweet coltsfoot	antidote for fish poisoning suppurative
<i>Filipendula multijuga</i>	meadowsweet SHIMOTSUKE-SŌ	Yashiroda p. 50	young tips	boiled in ash & soaked in water, then eaten fried or in salads	—
<i>Gentiana scabra</i> var. <i>buergeri</i>	rough gentian RINDŌ	Suzuka p. 12	roots	—	digestive tonic

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<i>Geranium thunbergii</i>	Nepal geranium GEN-NO-SHŌKO	Yashiroda p. 50 Suzuka p. 13	foliage entire plant	made into tea, once very popular	dried, an astringent & digestive aid cut, dried in shade, steamed & condensed for intestinal troubles; anti-diarrheal
<i>Glehnia littoralis</i> (<i>Phellopterus littoralis</i>)	corkwing HAMA-BOFU	Yashiroda p. 52 Suzuka p. 7	young leaves leaf stalks roots	pickled for fragrance and added to sliced raw fish, and vinegared dish	—
<i>Gynura bicolor</i>	velvet-plant	Yashiroda p. 57	foliage	eaten flavored with sauce of SAKE, soy sauce and vinegar	since ancient times, remedy for gold-fish diseases—still used as a medicine today
<i>Hemerocallis longituba</i> <i>H. fulva</i> var. <i>kwanso</i> <i>H. middendorffii</i> var. <i>esculenta</i> <i>H. exaltata</i>	daylily NO-KANZŌ YABU-KANZŌ ZENTEI-KA TOBISHIMA-KANZŌ	Kato p. 19	young leaves	eaten fried and in salad, with oil	—
<i>Hibiscus syriacus</i>	rose-of-sharon MUKUGE	Hano p. 38	dried flowers	—	cure for intestinal troubles
<i>Hosta montana</i>	large-leaved plantain lily ŌBA-GIBŌSHI	Kato p. 19 Ohyama p. 58	young leaves	salads and soups pickled	—
<i>Houttuynia cordata</i>	— DOKUDAMI	Yashiroda p. 47 Suzuka p. 13	complete plant	—	dried: diuretic antidote for poison applied to tumors & wounds
<i>Hydrangea macrophylla</i> var. <i>thunbergii</i> <i>Kalimeris pinnatifida</i>	big-leaved hydrangea AMA-CHA YŪGAGIKU	Yashiroda p. 49 Kato p. 22	leaves —	withered leaves, dried & rubbed in hands, make a sweet tea popular herb	—

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<i>K. pseudo-yomena</i>	YOMENA				
<i>Laportea macrostachya</i>	wood-nettle MIYAMA-IRA-KUSA	Kato p. 19 Ohyama p. 58	young stems	very sweet after boiled or preserved	—
<i>Lilium auratum</i>	goldband lily YAMA-YURI	Kato p. 19	bulbs	commonly eaten delicacies	—
<i>L. lancifolium</i>	tiger lily ONI-YURI				
<i>Lycium chinense</i>	Chinese wolfberry KUKO	Yashiroda p. 54 Hano p. 35 Yama-guchi p. 40	dried leaves fruit & rootbark young leaves berries	— salads, tonic tea & eaten with boiled rice lycium tea & wine	— medicine —
<i>Matteucia struthiopteris</i>	ostrich fern KUSA-SOTETSU	Kato p. 19 Ohyama p. 58	young uncurling fronds	boiled greens, salads, stewed, or as seasoning for rice bran paste	—
<i>Mentha arvensis</i> var. <i>piperascens</i>	Japanese field mint HAKKA	Yashiroda p. 53 Suzuka p. 7	dried leaves oils used in making:	— candies, drinks, menthol	medicines internal & external medicines dentifrices
<i>Oenanthe javanica</i>	water dropwort SERI	Yashiroda p. 52 Suzuka p. 9	tender leaves leaves young leaves & leaf stalks in spring roots	one of best greens for winter SUKIYAKI finely chopped, flavor soups, salads & chicken give unique fragrance to soups used in cooking, boiled or fried popular spring herbs	—
<i>Osmunda cinnamomeum</i> var. <i>fokiense</i>	cinnamon fern YAMADORI-ZENMAI	Kato p. 22	—		—
<i>Paeonia lactiflora</i>	peony SHAKU-YAKU	Yashiroda p. 48	root bark	—	medicine
<i>Paeonia suffruticosa</i>	tree peony BOTAN	Takagi p. 43	—	—	—
<i>Panax japonicus</i>	Japanese ginseng TOCHIBA-NINJIN	Yashiroda p. 51	root-stocks	—	dried, aromatic tonic
<i>Panax schinseng</i>	Asiatic ginseng CHOSEN-NINJIN	Susuka p. 9	roots	—	dried, tonic & medicine for heart trouble

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<i>Perilla frutescens</i> var. <i>crispa</i>	perilla SHISO	Yashiroda p. 53, 54 Suzuka p. 6 Makihara p. 15	leaves	green-leaved plant: salads; purple-leaved cultivar: scarlet coloring for pickled apricots, ginger & tubers of Japanese artichoke (<i>Stachys sieboldi</i>)	
			leaves	spice for bean curd garnish for TEMPURA	medicine
			flower spikes	soups; in more advanced stages, fried	—
			seedlings	spice for sliced raw fish preserved in salt, used in TEMPURA; spice in making pickles	—
			seeds		medicine
			stems	—	medicine
<i>Perlasites japonicus</i>	sweet coltsfoot FUKI	Yashiroda p. 57, 58 Kato p. 19 Suzuka p. 8 Hano p. 38	leaf-stalks	first boiled, then soaked in cold water & bark removed. Ready for use as seasoning or dish in themselves eaten boiled, baked or fried, preserved with salt, sugar or rice bran	—
			unopened flowerheads	first boiled, then soaked in cold water, then served with or without soy bean paste; chopped as spice for soups & boiled fish	medicine
<i>Perlasites japonicus</i> var. <i>giganteus</i>	giant sweet coltsfoot AKITA-BUKI	Yashiroda p. 58 Ohshima p. 25	leaf-stalks	boiled or pickled for winter use as flavorful soup green pickled with bean paste, SAKE lees or sugar	—
			flower bud	eaten while still green with soy bean paste, or boiled down in soy sauce	—
			leaves	—	—
<i>Phragmites longivalvis</i>	Japanese common reed YOSHII; KITA-YOSHII; ASHI	Hisaoka p. 41	roots	—	boiled-down extract stanches flow of blood; diuretic; antidote for poison from spoiled fish, crab, pork, etc.
<i>Platycodon grandiflorum</i>	balloon-flower KIKYŌ	Yashiroda p. 25	roots	—	cough remedy
			young foliage	salad	—

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<i>Polygonatum falcatum</i>	Japanese Solomon's seal	Hano p. 35	root-stocks	—	good for bruises
<i>Polygonum hydropiper</i> & cultivar.	NARUKO-YURI smartweed YANAGI-TADE; MATADE	Yashiroda p. 47	leaves	TADE-SU = leaves, boiled rice & vinegar	—
<i>P. hydropiper</i> 'Fastigiatum'	— AZABU-TADE	Suzuka p. 6, 7 Makihara p. 15	cotyledons (seed leaves) spikes	ground & made into vinegar paste to garnish sweet fish broiled in salt fresh as garnish for SASHIMI (sliced raw fish) TEMPURA & SUSHI (vinegared, boiled rice combined with other foods) & any summer dish	—
<i>Polygonum sachalinense</i>	giant knotweed	Kato p. 22		spice for sliced raw fish	—
<i>P. cuspidatum</i>	O-ITADORI Japanese knotweed ITADORI		—	added to SUSHI eaten with mackerel commonly used herbs	—
<i>Pteridium aquilinum</i>	bracken WARABI	Kato p. 22 Takagi p. 42	young fronds only	favorite spring herb, served after harsh taste removed	—
<i>Pueraria lobata</i>	Kudzu vine	Takagi p. 43	roots	starch	—
<i>Raphanus sativus</i>	KUZU radish DAIKON	Makihara p. 15	—	besides use as vegetable, garnish for TEMPURA	—
<i>Rehmannia glutinosa</i>	pink perfection AKA-JIO	Suzuka p. 13	—	—	after drying, used as tonic
<i>Rubia akane</i> (<i>R. cordata mungista</i>)	Bengal madder AKANE	Yashiroda p. 54	roots	—	dried to reduce fever & arrest hemorrhage
<i>Rumex acetosa</i>	sorrel SUIBA	Kato p. 22	—	popular herb	—
<i>Sanguisorba officinalis</i>	garden burnet WARE-MOKŌ	Yashiroda p. 50	young leaves	after bitterness removed, used in salads	medicine
<i>Saxifraga stolonifera</i> or (<i>S. sarmentosa</i>)	strawberry saxifrage YUKI-NO-SHITA	Yashiroda p. 49	dried roots leaves & juice leaf-blades	— fry	lightly toasted leaves a crude folk medicine
			flower scapes leaves	tasty when salted fried after slight boil, as salad	

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<i>Scutellaria baicalensis</i>	Baikal skullcap KOGANEHANA or OHGON	Susuka p. 13	roots	—	reduce fever
<i>Smilax oldhamii</i>	cat-brier YAMA-KASHŪ	Kato p. 19 Ohyama p. 58	growing tips, <i>i.e.</i> , leaves & stem	after brief boil, served in salads, fish salads, or combined with soy sauce, vinegar & rice-wine	—
<i>Swertia japonica</i>	— SEMBURI	Yashiroda p. 53 Suzuka p. 12	entire plant	—	dried & boiled down for a stomach tonic
<i>Thalictrum minus</i> var. <i>hypoleucum</i>	meadow-rue Ō-KARAMATSU	Kato p. 21	—	popular herb	—
<i>Thymus quinque-costatus</i>	thyme relative IBUKI-JAKŌ-SU	Yashiroda p. 54	—	used like thyme	—
<i>Trichosanthes cucumeroides</i>	Japanese snakegourd KARASU-URI	Hisaoka p. 41	dried tubers	—	diuretic blood purifier
<i>Typha latifolia</i>	cattail GAMA	Yashiroda p. 44	pollen	some people eat it, it is said	dried as medicine
			young aromatic leaves	some people eat it, it is said	
<i>Valeriana fauriei</i> (European var.)	European valerian KANOKO-SŌ	Yashiroda p. 54, 55	roots	—	sedative, cure for nervous diseases, especially hysteria
<i>Valeriana officinalis</i>	common valerian KANOKO-SŌ			salad green	
<i>Veronicastrum sibiricum</i>	— KUGAI-SŌ	Yashiroda p. 54	young leaves	after bitterness removed by dipping in boiling water	
			stem roots		dried, folk remedy for rheumatism
<i>Viola brevistipulata</i>	large-leaved violet ŌBA-KI-SUMIRE	Kato p. 19	—	herb	—
<i>Wasabia japonica</i>	— WASABI	Yashiroda p. 48 Kato p. 19 Suzuka p. 4 Hano p. 35 Makihara p. 15	rhizome, grated	added to soup just before serving, bean paste, chicken, sliced raw tuna, bonito & other fish; garnish for SUSHI	
			rhizomes & leaf stalks	after being soaked in salt water, preserved in SAKE lees	
			leaves	pickled as garnish	

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<i>Zanthoxylum piperitum</i>	prickly-ash SANSHŌ	Yashiroda p. 50 Kato p. 18 Hano p. 35 Makihara p. 15	young leaves leaves, flowers & immature fruits seeds & pods	soups; when boiled with meats & fish, suppresses their strong odor fresh, enhances flavor of dishes grated, pickled or boiled down in water, sugar & soy sauce & preserved ground: spice; pods powdered & mixed with flour for cake, KIRI-SANSHO	fruits also used as medicine
<i>Zingiber mioga</i>	Mioga ginger MYŌGA	Yashiroda p. 47 Suzuka p. 5 Makihara p. 15	inflorescences young leaves & sheaths young shoots	sharp-tasting, for soups, fried foods & vinegared dishes pickled with salt, vinegar & SAKE, ices minutely chopped: garnish for soup, sliced, raw fish, etc. after blanching, used in soups, TEMPURA, as a spice for bean curd, also pickled	— — —
<i>Zingiber officinale</i>	common ginger SHŌGA	Makihara p. 15	young rhizomes	pickled, as garnish for broiled fish; grated, added with juice to soups, etc.	—



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Gardens

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Miniature
Plants

Gardens
in Sinks and
Troughs

Propagating
Dwarf
Conifers

AUTUMN

1968

NEW SERIES



AMONG OUR CONTRIBUTORS

- ANNE ASHBERRY has a nursery near Chelmsford, in Essex, England, where she specializes in alpine plants and dwarf conifers for miniature gardens. Her most recent book is *The Alpine Lawn*, published in 1966 by Hodder and Stoughton, Ltd., London.
- JOE ELLIOTT is writing a book on trough and sink gardens for The Alpine Garden Society of Great Britain. He operates the Broadwell Nursery, Moreton-on-Marsh, in Gloucestershire, England. In 1939, Mr. Elliott was an exchange student from Edinburgh at the New York Botanical Garden and frequently visited the Brooklyn Botanic Garden.
- ROY ELLIOTT, who contributed many of the photographs of alpine plants and sink gardens, is an Honorary Editor of The Alpine Garden Society's *Quarterly Bulletin*. He lives in Handsworth, near Birmingham, England.
- H. LINCOLN FOSTER and LAURA LOUISE FOSTER are enthusiastic rock gardeners in Falls Village, Connecticut. Mr. Foster is the author of *Rock Gardening—A Guide to Growing Alpines and Other Wildflowers in the American Garden* (1968). It is illustrated by Mrs. Foster. The Fosters are active in the American Rock Garden Society, of which Mr. Foster is a past president.
- DOROTHY CHILDS HOGNER and her husband Nils Hogner are proprietors of Hemlock Hill Herb Farm, Litchfield, Connecticut. The two have collaborated on several books on topics ranging from herbs and travel to subjects of interest to children.
- GEORGE KALMBACHER, a taxonomist at Brooklyn Botanic Garden, is an enthusiastic observer and collector of cacti. He is the author, with M. M. Graff, of *Tree Trails in Prospect Park* (1968).
- MARGARET E. PINNEY of Armonk, New York, has specialized in growing and writing about miniature roses. She has grown hundreds of them in her own garden. She is the daughter of Sarah V. Coombs, who was also an accomplished gardener and writer.
- GEORGE SCHENK owns a nursery, The Wild Garden, in Kirkland, Washington. The nursery's specialty is perennials for landscaping purposes. Mr. Schenk admits that he may grow "plants that will interest only one or two gardeners in the United States."
- JOEL W. SPINGARN is a businessman whose great interest in dwarf and pygmy conifers led him to establish a nursery devoted to them as well as some unusual forms of other woody plants. He lives in Baldwin, New York.
- ALYS SUTCLIFFE, Horticulturist Emeritus of Brooklyn Botanic Garden, has long been a devotee of miniature gardening. She is the author of *House Plants for City Dwellers*, a Dutton Garden Guide, published in 1964.

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Miniature Gardens

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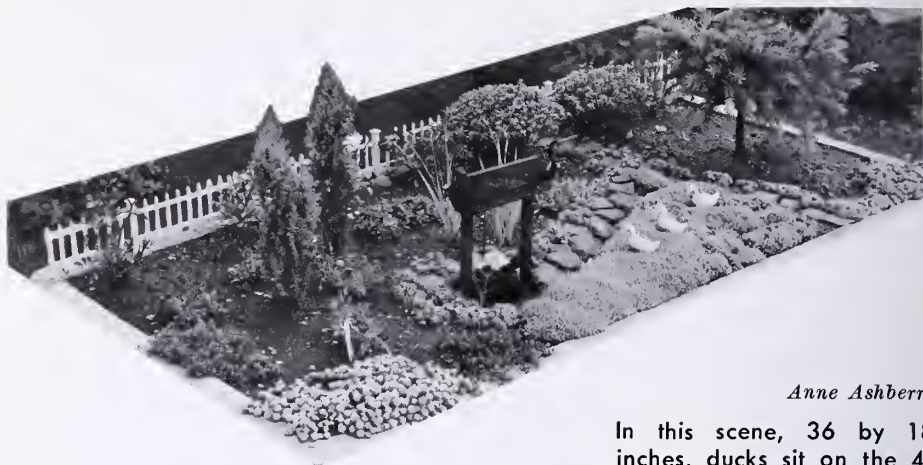
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Anne Ashberry

In this scene, 36 by 18 inches, ducks sit on the 4-inch cushions of *Scleranthus biflorus*; roses and rhododendrons grow against the fence.



Brooklyn Botanic Garden

Sink and trough gardening has always been one of the finer specialties of English gardeners. The sinks, above, are on display at Wisley, the Royal Horticultural Society's test gardens, and are planted with alpines and other miniature plants.

BROOKLYN BOTANIC GARDEN

The idea of miniature gardens is not new, yet it deserves new attention from all who love plants. Indoors or out, miniature gardens offer a novel approach to the art of growing and displaying many plants in a minimum space.

House plant enthusiasts—by instinct plant collectors and skillful growers—might well appraise past efforts, then consider the possible rewards of discovering a whole new coterie of plants, and using them in creating miniature gardens. Although there is indeed “art” in well-grown and well-groomed house plants, there is generally no trace of art in their collective display—especially with a miscellany of red clay pots of varying sizes. The clay-pot era was strictly utilitarian. The common clay pots are design-less and indeed they were never conceived for the esthetic display of living plants. Moreover, many of the more artistically designed “modern” containers leave much to be desired.

The greatest challenge, it seems to me, is the opportunity of expanding one's own gardening and horticultural horizons—self-education in the world of plants. Most of the species amenable to the creation of a tiny landscape are not generally familiar to most of us, and may not be too easy to obtain (page 37). A list of possible sources for unusual material begins on page 64.

Knowing the space and growing conditions available in your home, consider the possibilities. Dish gardens, terraria and their like offer traditionally simple ways to start; let taste and horticultural urge determine the course from there on. If to be grown out-of-doors, the problem is different, but the challenge remains. Whether miniature desert, woodland, bog or mountain landscape, the possibilities are there. Many will choose to do miniature formal gardens.

Guest Editor Alys Sutcliffe needs no introduction to Members and others familiar with the Botanic Garden. To new readers let me report that she is a 40-year veteran of the staff, and for many years of that time was BBG Horticulturist. Though she retired in 1960, she has continued to project her horticultural skills through writing, teaching a number of our popular level courses and, most recently, as Technical Director of a new BBG film **PLANTING AND TRANSPLANTING AT THE BROOKLYN BOTANIC GARDEN** (to be released early in 1969).

With this issue we announce with regret the retirement of Miss Carol Woodward from Botanic Garden service—after 8 years of distinguished editorial work. At the same time we take pleasure in reporting the appointment of Mrs. Marjorie J. Dietz as Editor of **PLANTS & GARDENS**.



Director



Don Normark

George Schenk's very miniature rock garden features a native fern *Cheilanthes tomentosa* and a common moss.

GARDENS IN MINIATURE

Alys Sutcliffe, Guest Editor

PEOPLE SO OFTEN are fascinated by small things—dwarf trees and shrubs and other small plants. Miniature plants and the gardens they grow in are becoming increasingly popular. Actually, the idea of miniature gardens is not new; they have been made for years. In England, stone water troughs and the stone sinks that used to be in kitchens of old houses have long served as plant containers. Many small, difficult-to-grow alpine plants as well as the more easily cultivated rock plants have been successfully grown in them. In this country, some very attractive rock gardens on a miniature scale have been assembled for exhibition at flower shows.

Opportunities as well as space for gardening are limited in cities, yet city dwellers crave the presence of living green plants and in summer may travel hundreds of miles to country, seashore and mountains, partly to satisfy this need. As miniature gardens can be planted in any containers of stone, iron, wood or earthenware, large or small but at least 4 to 5 inches deep, they make it possible for city dwellers to enjoy gardening, too. Collections of small, slow-growing plants can

be combined in a miniature garden in a design that is interesting and decorative. An alpine cliff with a few mountain plants and one or two small evergreens need not take up more than 20 by 12 inches; a bit of the desert requires even less space. So even in the city, the owner of a penthouse, small terrace or restricted backyard can enjoy a rock garden, a portion of woodland, bog or water garden—even a herb or rose garden.

Indoors, in winter, apartment dwellers as well as suburban gardeners are hampered by the dry, too-warm atmosphere, but here the devotees of desert plants, succulents and cacti (and there are many) come into their own. Dry atmospheric conditions (and lack of sunshine) can also be thwarted by making miniature gardens in glass-enclosed cases and large bottles.

For everyone, probably the greatest satisfaction to be derived from miniature gardens, indoors and out, arises from the vast array of plant material available, both from this country and around the world. Some plants—small seedling trees and many lovely native plants—are easily obtained from nearby woods and fields, if

permission for such forays has been obtained and no conservation laws are ignored; or the same kinds of plants can be purchased. Small nursery-grown plants are usually easier to set out and often have a better chance of survival than may be the case with collected plants.

But local plant material is just one possibility for miniature gardens. The wide range of climatic conditions in areas where the plants originate, as well as conditions that prevail where the gardens are to be made, increases the number of small plants that are suitable. Some plants are so small—and naturally grow so slowly—that they present no problems. Others must be kept in a more or less confined space to check their growth and may need occasional pruning to keep them in proportion to their surroundings.

Miniature gardens can simplify the growing of plants with definite soil preferences. An individual garden can be made solely for lime-loving plants or for those that need a growing medium of acid peat moss. Plants that do best in dry soil can be grouped in the same container; those that need moisture in another.

For people who have always wanted a garden of hybrid tea roses but lacked the necessary space, there is the garden of miniature roses. It can be designed for a suitable container with truly miniature roses, small plants barely 10 inches tall



A stone-like container for alpine made of cement by the Fosters (see page 21).

that resemble in every other way typical rose bushes. The most exquisite flower arrangement I have ever seen was a spray of a few tiny pink rose buds, each no longer than a quarter of an inch, combined with blue forget-me-not flowers.

Proper maintenance of a miniature garden, of course, is as necessary as it is with any kind of a garden. A terrarium or a desert garden may require the least attention, especially in the matter of watering. Other types of miniature gardens may require daily watering.

In winter, miniature gardens of hardy plants will need some protection against extreme cold. Those gardens with rare horticultural treasures may require some sort of cover to fit over them in the event of one of the torrential downpours that are apt to occur at times in almost any region. Without such protection, soil may be washed away and plants lost.

This Handbook has been planned to suggest some of the many types of miniature gardens that can be created and the plants that can be grown in them. The lists of plants for the various gardens described are not intended to be inclusive, but in most cases these plants are the ones that have been tried and proved to be small and remain so without impairment of their natural shape. Few gardeners—and those who practice miniature gardening are not going to be an exception—are ever content with limited lists. After all, half the fun of gardening has always been in the seeking out and trial of different plants. ♦



© Roy Elliott
Saxifraga 'Valerie Finnis'



Miniature Gardens Ltd.

Anne Ashberry's landscapes in miniature—all in perfect scale—are delightfully displayed on a terrace at her home and nursery in Chelmsford, Essex.

MINIATURE LANDSCAPES

A LOGICAL DEVELOPMENT from the planting of alpine and rock plants in sinks and troughs in England has been the creation of complete little gardens—total landscapes in miniature—in various kinds of containers. Anne Ashberry, who has a nursery in Essex, England, has become a well-known specialist in the designing of miniature gardens. Examples of her creative skill include miniature formal rose gardens, complete with hedges, paths, walls, arches and formal pools as well as miniature versions of more informal kinds of English garden and countryside scenes. For plant material, Anne Ashberry chooses naturally diminutive kinds, her emphasis always being on the landscape effects she can create with them. The containers she has used vary from earthenware saucers or seedpans (preferably unglazed and painted a soft stone color) to the usual cement or stone sinks and troughs. For indoor miniature gardens, she also uses all kinds of bottles and jars, large and small, and fish tanks.

Miss Ashberry's instructions for preparing and planting a miniature garden (as described in her book *Gardens in Miniature*) in a sink or similar container follow:

Soil Mixture

- 1 part fibrous loam
- ½ part coarse sand
- 1 part leafmold or peat moss
- ½ part grit (can be granite or limestone chips)

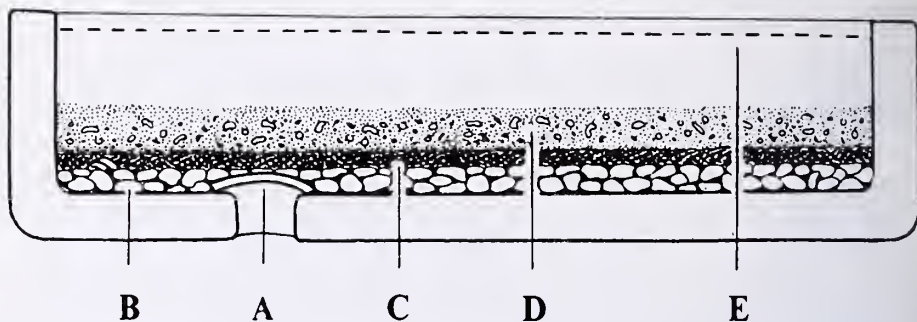
After mixing these ingredients, cover the outlet hole of the container with a piece of slate or broken flower pot. Then add enough drainage material to cover the base. Next add peat moss in an amount sufficient to hide the crocks or drainage material completely. Water the peat moss thoroughly. When it is saturated, it will

swell and form a "blanket" which will prevent the soil or compost (which is added next) from trickling down between the crocks. If this should happen, the drainage material becomes clogged and does not perform its function properly. The peat moss also holds some moisture which plant roots can draw upon as needed.

The next step is to cover the peat moss blanket with enough of the prepared compost to bring it to about one-third the full depth of the sink. Press down the mixture with your palms to make sure that there are no large air pockets which might later cause the roots to shrivel. Yet

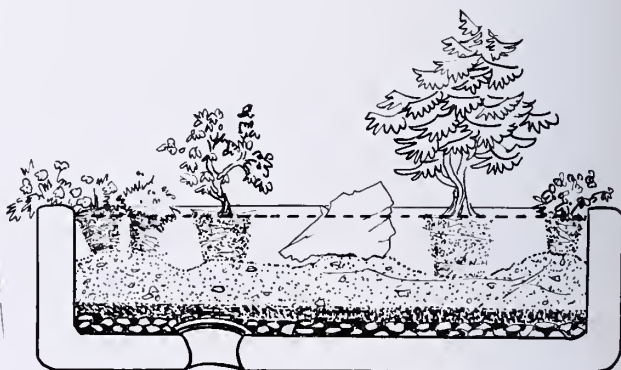


The Prince of Wales garden contains conifers started from cuttings in 1948 on the day Prince Charles was born. It was photographed 10 years later at the time when he became Prince of Wales.



A. Crock. B. Drainage. C. Peat. D. Compost. E. Level of compost at final stage.

Diagrams above and at right show how Miss Ashberry plants her miniature landscapes. As with any miniature garden, it is important to put all plants in position before all of the prepared soil mixture is finally added to the container and then packed carefully around all the plants.



Diagrams from Gardens in Miniature

do not ram it so hard that roots will have difficulty in penetrating it; you should aim at a moderately firm soil layer.

The Planting Process

If your plants are in pots, you can now place them in position to make sure you like the plan and their groupings, but most important, to make certain that each plant will have sufficient root room. Although eventually all the roots will intertwine, in the early stages they need surrounding space as they emerge gradually from their tight pot shape.

As nearly all alpine plants and miniature trees are grown at nurseries in small pots, they can be knocked out of them at any season of the year without root injury. When they are lifted from the open

ground as required, there is more danger of root injury. When a well-grown plant is turned out of its pot, you can usually see that the roots have wound themselves round and round and close to the inner surface of the pot, forming a neat pot shape.

When you have put all plants in position (along with a rock or rocks) and are satisfied with the grouping, one by one, tip each plant out of its pot, putting a little soil around it for support as you attend to the next one. When all plants are in place and at the correct level, add the remaining compost and firm around each plant. The final soil surface should be about one-half inch below the top of the sink, less for a really small container.



Garden scene with pool. The trough is 36 inches by 24 inches and is planted with *Chamaecyparis obtusa* 'Nana', and *Juniperus coxii*, the Chinese weeping juniper. There are also alpines, and miniature roses have been planted against the trellis.

© Anne Ashberry

A garden in a container 20 inches by 12 inches featuring various alpines and other plants. The miniature tree is *Chamaecyparis obtusa* 'Juniperoides' (22 years old). Other plants include *Asplenium trichomanes* and several kinds of saxifrages.



(Continued)

Two rose gardens in miniature



There is a total of ninety rose plants in this formal garden designed by Miss Ashberry. The size of the trough is 48 inches by 36 inches. Some of the varieties she has included are *Rosa chinensis* 'Minima' (better known as *Rosa roulettii*), 'Elf', 'Little Princess', 'Maid Marion', and 'Sweet Fairy'.



A trough 20 inches by 12 inches contains this small landscape. A mixed border of various kinds of small alpiners surrounds a formal garden of miniature roses. It has a center accent of a silver model of Eros. The two evergreens at the rear are *Juniperus communis* 'Compressa', one of the best conifers for use in miniature gardens.

Formal and informal landscapes



This indoor trough garden of conifers and various alpines is suitable only for a very cool room where several hours of sunshine or good light can be expected daily.



A miniature landscape with various alpines, conifers, a temple and formal pool was made by Miss Ashberry for Queen Elizabeth II when she was Princess Elizabeth.

A MINIATURE BOG GARDEN

*Moisture, sun and suitable
plants are its requirements*

Alys Sutcliffe

A BOG GARDEN can become a most interesting miniature garden, or perhaps more rightly, a miniature section of natural countryside. In a suitable receptacle one can grow some of the plant life that thrives under wet conditions—the extreme from those needed by desert plants. Bog plants must have moisture—and plenty of it—for the greater part of the year. They need sun, too, so that a special environment must be created if they are to thrive. The bog garden has a subdued color effect but also, a sense of wildness that comes from the grasses that spring up with the different plants and from which one can almost expect marsh birds to rise.

Most interesting for a bog replica are insectivorous plants, some of which have given rise to fabulous legends of humans being caught and never seen again! The plants for the small bog are native to the temperate zone, although not all of them will survive outdoors in the more northern states without protection.

For the small bog's insectivorous plants there are first the pitcher plants (*Sarracenia*); some of these growing under natural, moist conditions would hardly come under the true miniature classification, but confined areas stunt their growth. The colors of these strange-looking plants range through reds, browns and greens. Their leaves are shaped like pitchers; some are straight and slender, some short and wide. All kinds have an expanded lip bearing nectar glands, which attract insects. The lip is also covered inside with downward-pointing stiff hairs; below are the steep walls of the pitcher, also covered with

downward-pointing hairs that prevent escape of the insects. Thus, once attracted, the insect slides to a watery grave as there is always fluid at the bottom of the pitchers. There digestive enzymes change the insect bodies into fluid that the cells of the plant can absorb. However, pitcher plants cannot live on insects alone. They depend also on the sugar in their chlorophyll-bearing cells.

A plant that really moves is the Venus fly trap (*Dionaea muscipula*). It looks somewhat like a miniature rat trap when the end of the leaf opens into two flaps edged with stiff bristles. In the middle of each flap are three sensitive hairs which, when touched by an insect, cause the flaps to shut, thus enclosing the insect. When the insect has been absorbed, the leaf opens again.

Sphagnum moss is the preferred medium for most bog plants; the next best is peat moss. The container can be a large earthenware bowl 5 to 6 inches deep, or an old iron or stone sink with the hole blocked up. Or for a larger non-portable bog, an old bath tub can be sunk up to the rim in the soil to disguise its origins. The main requirement is that the container must hold water at a constant level for most of the year. Small bog gardens, those that contain only a few plants, can be kept indoors in a very sunny window or elsewhere away from a radiator.

A depth of 5 to 6 inches is sufficient for the container, which is filled 4 inches deep with peat moss. Gradually moisten it until it is saturated. Obtain live sphagnum moss from a real bog, pull the strands apart and lay them over the peat moss until you have a 2-inch cushion. (It is possible to purchase sphagnum moss by the pound from nurseries that sell insectivorous plants.) Keep the mixture moist until the sphagnum begins to grow.

When your sphagnum is growing, it is time to add other plants. Avoid getting garden soil into the container: it may introduce a fungus or other organisms detrimental to insectivorous plants. It does not matter if the bog dries out occasionally or even gets frozen (although, of course, a bog garden in full



Gottscho-Schleisner

Pitcher plants dominate this sphagnum-bog tray garden which also contains cranberry, bog andromeda and Venus fly trap. Plants collected from bogs often introduce other moisture-tolerant plants that add to the naturalness of the garden.

growth can not be moved in- and out-of-doors in the middle of winter). In nature, bogs dry out for periods or remain frozen, but the necessary water level should be kept in late winter, spring and early summer, which is the growing season. Often when you think you have lost a plant, it will reappear when growing conditions become favorable.

Some Plants for a Small Bog

Acorus gramineus pusillus (Dwarf Sweet Flag). Grasslike foliage; blue flowers. From 6 to 10 inches tall.

Caltha palustris (Marsh Marigold). One of earliest of bog plants to flower in spring. Clusters of cupped, golden yellow flowers and heart-shaped, bright green leaves of a fleshy texture. Height about 2 feet. Plants may outgrow bog garden in small container.

Dionaea muscipula (Venus Fly Trap). An insectivorous plant. Basal rosettes of

leaves with flat petioles and round 2-lobed blades which close when touched. White flowers in summer.

Drosera rotundifolia (Sundew). An insectivorous plant. Small plants with rosettes of foliage about 1½ inches long; small white flowers in summer.

Menyanthes trifoliata (Bogbean). Creeping aquatic plant. Fragrant white flowers tinted pink. For acid soil in cool bog.

Myosotis scorpioides (Forget-me-not). Free-blooming habit, producing clusters of small blue flowers. Height, 8 to 18 inches.

Sarracenia purpurea (Common Pitcher Plant). An insectivorous plant. The basal hollow leaves are the "pitchers." Other species of *Sarracenia* are also suitable. All need large containers as leaves may grow from 10 to 20 inches long.

Vaccinium macrocarpon (Cranberry). Creeping evergreen with stems about 6 inches tall. Suitable for small gardens. ♦



© Roy Elliott

This fine example of an English stone sink garden in a superb setting features *Saponaria*, *Androsace* (foreground) and other alpine plants that need special conditions.

ROCK PLANTS IN STONE SINKS AND TROUGHS—THE ENGLISH WAY

*Create correct conditions for difficult plants
in stone sinks and their modern equivalents*

Joe Elliott

ROCK GARDEN PLANTS have been a special interest of mine for many years. I find that I have often been more successful with some of the more tricky and difficult alpine plants in stone sinks and troughs than in any other part of the garden.

Recently methods of making alternatives to the genuine old stone troughs, which are no longer plentiful, have been devised and are perfectly acceptable. One of these is the casting of troughs in what has become known as Hypatufa here in England (a mixture of cement, sharp sand and sphagnum peat).

Alternative to Stone Sinks

A further use for Hypatufa is simpler and utilizes an object which is in plentiful supply—the white glazed sinks which are being taken out of houses these days in favor of the stainless steel alternatives. Untreated, these white horrors would be unthinkable as plant receptacles, but by coating them with Hypatufa, only the most pernickety would realize they are not made of natural stone.

The method of treatment is as follows: first make sure the sink is absolutely clean and free of any grease left over from its original purpose. Then paint it with a coating of one of the modern bonding materials. When it has partially dried but is still tacky, apply a coating, about a quarter of an inch thick, of Hypatufa mixed to such a consistency that it can be easily applied without running off. The proportions, by bulk not weight, are one part cement, one part sharp sand and two parts dry sifted sphagnum peat. The materials are mixed

with water. The inside of the sink need not be coated but it is wise to bring the mixture over the lip and 2 or 3 inches down the inside walls so that no white glazing will show after soil and plants are added.

The drainage hole should be covered with several pieces of broken pot. If there is a minimum of 4 or 5 inches of depth to the sink, the whole of the base should then be covered with some drainage material—finely broken pieces of pot, broken bricks, or coarse gravel. If the trough is a very shallow one, only 2 or 3 inches deep, the drainage material can be dispensed with. Quite a wide range of plants can be grown successfully in these shallow sinks, but one has to remember that they will need more attention to watering when the rain doesn't do it for you.

With the drainage material in place, the next phase is to cover it with some coarse material to prevent the finer soil penetrating to the very bottom of the trough. Coarse peat, siftings from the compost, or even a thin turf turned upside down, will do. The sink can then be filled with the soil in which the plants themselves are to grow; the mixture will depend to a certain extent on what plants are to be grown. The soil should be added a few inches at a time and firmed well to prevent later shrinkage and compression.

The Question of Rock

This is essential, not only for appearance but because so many alpine plants are much happier when their roots can penetrate or burrow under rocks. The ideal rock is tufa, a very porous limestone formation which absorbs water easily and



Roche

Sink gardens are part of rock garden of Mr. and Mrs. J. Starkey, Tramore, Ireland.

is soft enough so holes can be made in it in which to grow some of the saxatile plants. The difficulty is that there are now few sources of supply, so one usually has to make do with whatever rock is available.

The aim should be to arrange the stone into an outcropping with inch-wide crevices in which some of the plants can grow. An effective scene is difficult to achieve with rocks that are too small; it is best to have one largish rock with smaller ones around it and beside it. Make sure that they are firmly bedded with at least one quarter of their bulk below soil level.

The Choice of Plants

It is sensible to restrict the plants in a trough to slow-growing and cushion types. One or two of the dwarf conifers are always effective, and *Juniperus communis* 'Compressa' is perhaps the ideal. It forms a tight, upright column of blue-gray and grows an inch or less a year. To break up the hard edges of the trough, a

few trailing plants tumbling over the sides are helpful. *Dryas octopetala minor* is such a plant. It is a charmer that will not outgrow its space, eventually making a curtain of its dark, glossy leaves spangled with snow-white flowers which are followed by fluffy seed heads. The miniature *Alyssum serpyllifolium* is also effective, with tiny silver leaves and many little heads of golden flowers in late spring.

Among the more tricky alpiners, *Viola delphinantha* is one that has grown successfully for me in a trough while not succeeding elsewhere for me in the garden. Twelve or fourteen years ago I put three plants into 2-inch holes bored into lumps of tufa. Two of them survived and now flower freely each year. It is a naturally saxatile plant on its native Mount Olympus and has proved unwilling to grow in any other position it has been offered in the garden—scree, crevice, in a pot under glass or in the open. In its position in tufa, it is a joy in



© Roy Elliott

Trough gardens in England are traditionally adjuncts of large-scale rock gardens.

June as it opens its inch-wide rosy-pink flowers, each with a curious horn an inch or more long.

Phyteuma comosum is another plant which naturally inhabits similar situations (but in the Dolomites); it grows very successfully in tufa in a trough. It is a curious plant with clustered heads of lavender blooms, each tapering to a deep purple tip. *Potentilla nitida rubra* of similar difficult habitat has prospered for me and has spread its silver leaves into a compact 6-inch cushion. The type plant is apt to be shy flowering, but *P. nitida rubra* produces flowers quite freely over several weeks in late spring and early summer.

Some Saxifrages for Sinks

The saxifrages are an enormous genus with many members suited to trough or sink gardening. The Kabschia group of saxifrages forms tight, slow-growing hummocks of close-packed, grayish leaves, seldom outgrowing their space.

They brighten February, March and April with their pink, yellow and white flowers. Two of the most reliable pink ones are saxifrages 'Jenkinsii' and 'Cranfourne'. A "must" for a trough is another plant of the Kabschia section, *Saxifraga grisebachii* 'Wisley'. Its inch-long leaves of brilliant silver-gray are arranged in rosettes of wonderful symmetry from the center of which emerge, in earliest spring, curious flower spikes whose bracts are covered in crimson velvet. It is a plant that even after thirty years never fails to appeal to me with its quaint beauty. As in nature, it enjoys being able to grow in a crevice.

Apart from the Kabschia group, many of the so-called silver saxifrages make ideal trough plants, flowering in late May and June. They have attractive silver-gray leaves which retain their beauty throughout the year. One of the best is *Saxifraga cochlearis minor*, but there are many more as the choice is wide in this saxifrage section.



© Roy Elliott

Many of the bellflowers native to mountain areas, like *Campanula petrophila* above, thrive in troughs. Its flowers, on 3-inch stems, are a beautiful pale blue.

Saxifraga retusa is quite a different plant to the previous kinds and is one of the best of all trough plants. It forms an absolutely prostrate carpet of tiny leaves to give an almost moss-like effect. The rosy-crimson flowers are borne on 1-inch high stems in early summer.

Campanula is another large genus but one needs to be wary of planting some species in troughs. Many, such as *Campanula cochlearifolia* and its varieties, beautiful though they are in the right place in the rock garden, are too running in habit to plant in a trough. If you can find it, *C. raineri* is sufficiently restrained in habit and very lovely with its inch-wide, shallow saucer flowers of delicate porcelain-blue carried almost stemlessly above the gray-green leaves. The fabulous *C. zoysii* has succeeded well with me planted in a tufa block. It is an odd species with lavender bell flowers an inch long which are crimped at their mouth like a miniature toby ruff. It is not the easiest of plants to grow and is much

loved by snails and slugs, but is worth a trial.

A close campanula relative is *Edraianthus pumilio* (sometimes listed as *Wahlenbergia pumilio*) with silvery, inch-long, needlelike leaves among which the almost stemless lavender flowers appear. I would place it among the twelve best trough plants.

Pinks and Gentians

The *Dianthus* genus is another in which there are many suitable trough plants, although obviously anything coming near the garden pinks would be too large. *Dianthus alpinus*, a true alpine dwarf, is the obvious choice with its glossy green leaves and bright pink flowers, each usually showing a beautiful speckled central zone. It grows only a couple of inches high. *Dianthus musaliae* is another choice dwarf and so, too, is *D. freynii*.

What about the gentians? Apart from the advantage of growing lime-hating gentians in the isolation of a trough when one's natural soil is not suitable, there are many which should be included whatever your soil. A "natural" for any trough is *Gentiana verna angulosa*, brilliant in color, never outgrowing its space. It is perhaps the most beautiful and nostalgia-evocative of all alpine plants. As a garden plant it cannot be considered long lived; two or three years of effective life is about all I can expect of my plants. It is important that it not suffer from extreme drought in summer.

Another suitable trough gentian is *G. acaulis* with magnificent sapphire trumpets lined with emerald. Quite unlike a typical gentian, both in leaf and flower, is *G. saxosa* with inch-high, bronze strap-shaped leaves and almost globular creamy-white flowers. Like *G. verna*, it is not as a rule long lived, but can be easily raised from seed.

When *Helichrysum milfordiae* was first introduced from the Drakensburg Mountains it was not thought that it would be hardy in this country. This has since been disproved, and provided drainage is perfect, it will survive any winter our British climate can abuse it with. Winter

damp is the greatest potential danger, so plant it in a crevice between two rocks where all surplus moisture can quickly drain away. If the rock is tufa, it will quickly root itself into this soft rock, and in such a position produce its inch-wide, snow-white everlasting flowers.

The flowers, incidentally, are most intensely sensitive to moisture. They open wide in the sunshine and at the first touch of water from the sky or from a container can be observed to fold themselves into tight buds in a matter of ten seconds or so.

A New Oxalis

Newly introduced from Patagonia is *Oxalis lacinita* with curious folded silver-gray leaves among which nestle funnel-shaped flowers an inch or so across. It seems to be a variable plant and the flower color may range from pale lavender to quite deep purple; the paler ones often show attractive veining of a deeper color. It seems to have tolerated life in a trough quite equably, though it has not succeeded in all other positions I have tried it in. *Oxalis enneaphylla* and its several forms are undoubtedly good trough plants, with attractive foliage even when the pink or white flowers are not showing.

Gardening as I do in the Cotswolds, I do not find the genus *Lewisia* as a whole very reliable out-of-doors. It is not the cold that bothers them; nor is it the lime in my soil. The myth that plants of this genus are lime haters has now been finally exploded, I hope. It is winter damp that bothers them most—or even summer damp if it is excessive. Both contribute to rotting of the crown. Often in a trough, however, one can devise special positions to prevent this problem. Several of the *Lewisia cotyledon* group, growing in a north-facing crevice between two pieces of tufa, have lived for five years and flowered freely each year. A number of the hybrids I have raised between *Lewisia brachycalyx* and *L. cotyledon* have also survived in similar situations. But *L. tweedyi* seems bent on suicide the first winter unless it has the protection of glass over its head.

In a similar north-facing crevice, *Ramonda myconi* has been happy for several years. It is an intriguing plant with flat rosettes of rugged spoon-shaped leaves and in May produces its deep lavender, orange-beaked flowers on 3- to 4-inch stems. In its native Pyrenees, it always inhabits the north-facing cliffs which are often oozing water when the plants are in flower, so it is important



© Roy Elliott

The flowers of *Oxalis lacinita* vary in color from lavender to deep purple.

that domesticated plants not suffer from summer drought.

Dwarf Shrubs for Sinks

Dwarf shrubs for sinks and troughs have to be chosen with the greatest care. It is all too easy to plant small specimens of shrubs and find in a few years that they have occupied the whole area to the exclusion of less robust neighbors. One or two of the really dwarf members of the willow genus can be safely included, such as *Salix reticulata*. It grows only a few inches high and has half-penny-sized leaves of glossy deep green beautifully marked with an intricate network of veins.

Some of the dwarfer daphnes such as *Daphne retusa* and *D. collina* could be

grown in larger troughs so that their delicious scent would be at least half way to nose level. I once planted *D. cneorum* in a trough by mistake, thinking at the time that it was *D. cneorum alba*. The type plant grew so vigorously—and I had been so unsuccessful with it in other parts of the garden—that I allowed it to remain and enjoyed its wonderful scent for several years, even though it swamped a number of choice neighbors. The white form, *D. cneorum alba*, is a very much dwarfer plant and makes a slow-spreading carpet, little more than an inch high, of dark inch-long leaves. They make a pleasant contrast to the snow-white flowers, which are also sweetly scented. ♦

(Courtesy of the Journal of the Royal Horticultural Society)



© Roy Elliott

A clay pot of different kinds of alpine plants becomes a miniature rock garden.

PORTABLE ROCK GARDENS— AMERICAN STYLE

Make your own stone-like containers for choice rock plants

H. Lincoln Foster and Laura Louise Foster

OUR NEW ENGLAND winters had proved disastrous for the ceramic containers in which we had attempted to grow dwarf trees and alpiners out-of-doors. Therefore we looked with longing and envious eyes at the fascinating miniature gardens grown in stone troughs and sinks in England.

These were not for us, we knew; stone troughs and sinks are not frequently, if ever, found lying around our barnyards. Our enthusiasm, however, was kindled by the sight of tight bunlike plants of androsace and saxifrage thriving in the English troughs, and we determined to try once again—this time making our own containers.

Hollowing out rocks—even fairly soft kinds such as lime-tufa—with a hand-held electric drill equipped with masonry bits and rasps is an arduous and time-consuming operation. However, we managed to excavate several large lumps of tufa brought to us from Ohio by a friend. Tufa planters are not suitable for plants which require acid soil conditions, of course, but lime-loving plants prosper in them.

We have also used lumps of weathered slag with considerable success. These came from the old slag piles left from the days when northwestern Connecticut supported an active iron industry. Fresh slag, unfortunately, may contain chemicals inimical to plants, but these have long since been leached out of the slag found in our area. Those pieces that are not hard and glassy are fairly easy to gouge out; but they tend to be brittle and are likely to break.

Feather-rock, which can be obtained from some garden centers and landscape suppliers, is very easy to carve and makes

excellent planters, although it is rather uninteresting in color and texture.

It would, of course, have been possible to have a monument maker excavate harder and heavier stones such as sandstone, but this would have cost a bit more than we cared to spend, even if we had succeeded in finding a man willing to undertake the task.

Because of the difficulty of finding and preparing suitable stones, we thought it might be possible to make concrete planters which would be both attractive and frostproof. We knew that large sink-size pots made of a standard mixture of cement, gravel and sand would be very heavy, and as we hoped to have our planters at least semi-portable, we set about experimenting with lighter substances with which to mix the cement.

Cement-Peat Moss-Perlite Mixture

Eventually we arrived at a mixture of 1 part Portland cement, 1½ parts of well-crumbled dry sphagnum peat moss, and 1½ parts of either Vermiculite or Perlite—the latter gives a rougher, more stonelike appearance to the concrete than Vermiculite.

Pots made of this mixture are fairly light: a container 22 by 22 inches and 8 inches deep can be lifted with no great difficulty. This is an important point, as it is necessary to move a planter around quite a bit in the process of making it.

The planters are also strong and frostproof. Containers made of this material have spent five years outdoors on our terrace without any sign of cracking or chipping, even though our winter temperatures frequently go below -20°F. For additional strength, however, the concrete is molded around an armature of 1-inch-

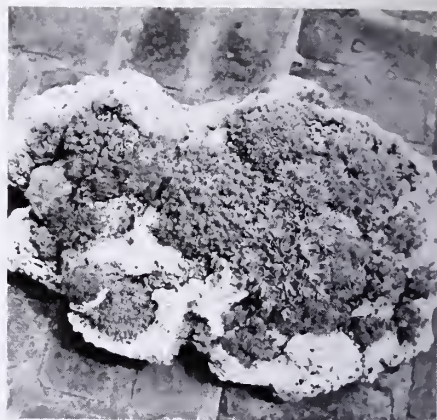


A chunk of well-weathered slag was hollowed out to make this handsome planter. It has the appearance of natural volcanic rock. It holds seven plants.

mesh chicken wire, a valuable product!

We found that we could tint the dead-gray concrete by adding dry lime-proof coloring powders to the mixture. (These powders, especially made for tinting concrete, can be purchased through most hardware and building-supply stores.) We found black, burnt umber, raw and burnt sienna, Venetian red, and ochre the most attractive colors, but blue, green, and vermilion are also available. We use about $\frac{1}{2}$ cup of powder for every quart of Portland cement in the mixture. Powders of several colors can be combined while dry to obtain various shades; it is also possible to make several batches of concrete of different colors and blend these to a lesser or greater extent when molding the planter. This gives the finished concrete a somewhat streaked and mottled color like that of many kinds of weathered rock.

It is important in making the mix to be sure that the Perlite (or Vermiculite), thoroughly crumbled sphagnum peat, and coloring powder—if any—are completely dry and well mixed before adding the dry cement. This mixture in turn should be very thoroughly blended before adding the water *a little at a time*, stirring well after each addition. The concrete should



Tufa rock, relatively soft and easy to work, was gouged out by electric drill to accommodate this planting of lime-loving saxifrages. Planting is 3 years old.

be very moist but not so wet that it slumps into a muddy puddle. (It is always possible to add a little more water if the mix gets too dry to work with.) If you use your hands to mix the concrete and to form the pot, it is not difficult, with a little practice, to feel when the consistency is correct: it is rather like that of fairly sloppy cottage cheese.

Making the Molds

We wanted our planters to be free-form and of various shapes and sizes so that they would resemble natural rocks as closely as possible. We finally hit on the idea of making molds of well-dampened fine sand covered with a sheet of thin, flexible plastic. The pots are made in a sandbox made of rough lumber, about 4 feet square and 6 inches deep. This is set on a table to bring it to convenient working height.

The planters are molded bottom side up. An assortment of kitchen bowls and plastic food containers—also placed upside down—are used as a base for the shaping of the inside of the pot. These are covered with firmly packed damp sand to form the shape wanted for the inside of the pot. (The outside of the completed planter will be approximately



Planter made of the authors' cement mixture contains 5-year-old *Juniperus procumbens* 'Nana', saxifrages, *Polemonium haydenii*, *Arenaria verna caespitosa*.



Juniperus chinensis 'Sargentii' has been in this cement planter for four years along with sempervivums, *Aquilegia jonesii* and white *Arabis androsacea*.

the same shape as the mound of packed sand, but will be larger by the thickness of the concrete.)

The sand mold is then covered by a dampened piece of old sheet to protect it while the chicken-wire armature is shaped over it. By clipping, bending and folding, the wire mesh can be made to fit fairly smoothly over the sheet-covered sand lump. Once the armature is formed it is set aside until needed and the sheet is removed.

A low dam of firmly packed damp sand is then formed around the base of the mound, an inch or so away from it. This creates a moat about 1 inch deep and from 1 to 2 inches wide, the dam delineating the outside of the rim of the planter. (At this point, there should still be in the sand box plenty of well-dampened sand for use in the next steps.)

Over the sand mold and its surrounding channel is now spread a large sheet of thin, flexible but strong plastic. This should be large enough to cover the mound, with enough remaining around the edges to more than cover the outside depth of the finished pot. The plastic is gently pressed into the trench around the mold. Wrinkles do not matter, as they add interest to the texture and shape; or, if

preferred, they can be smoothed off after the pot is partially hardened. You should also have ready several wooden dowels or short pieces of stiff plastic tubing to use in making drainage holes in the bottom of the planter. These should be about $\frac{1}{2}$ inch to $\frac{3}{4}$ inch in diameter.

You are now ready to mix the concrete according to the instructions given earlier. Using your hands, a spoon, or a mason's trowel, fill the trench around the inner mold with concrete and cover the mold itself with about $\frac{1}{2}$ inch of the mixture. Next place the armature over the cement-covered mold, pressing it down firmly so that the edge is embedded in the concrete in the trench. The armature will not fit snugly, but should not be allowed to buckle too much. Cover the wire with more cement, working it down through the mesh so that it bonds well with the cement underneath. The total thickness of the cement should be at least 1 inch on the sides of the pot and a little thicker on what will eventually be the bottom. The thicker the cement, the stronger the finished pot will be—and the heavier. Do not worry if you run out of concrete before you have finished molding the pot—just mix up another batch.

(Continued)

The next step is to bring the edges of the plastic up against the outside of the planter. Next, scoop the extra sand in the box firmly against the outside of the plastic to hold it in place and keep the wet cement from slumping. Leave the top open and work several of the dowels through the cement and the chicken wire that is sandwiched between the two layers. The bottom ends of the dowels should be in firm contact with the plastic covering the sand mold under the cement. The dowels should be spaced from 2 to 3 inches apart to provide adequate drainage holes. A low ridge of cement may also be raised around the bottom of the planter

to keep the drainage holes from direct contact with the ground when the container is right side up.

The plastic is not brought up to cover the bottom of the pot while the concrete is setting. This process will take from 12 to 24 hours, during which time the pot and its surroundings should be left undisturbed. The larger the pot the longer it will take to set.

When the concrete is so firm that it cannot be dented when pressed hard with a finger but is still soft enough to be scratched by a fingernail, pull away the sand, then peel back the plastic. Remove the dowels by twisting and pulling them



1 Kitchen bowl serves as form



2 Sand is packed over bowl



3 Damp sheet protects sand mold



4 Fitting wire support over mold

gently and level off the bottom of the planter by scraping away extra cement with the edge of a horizontally held pane of glass or a flat board. The concrete will still be soft enough to carve and shape as desired. Be careful, however, not to expose the underlying wire mesh. The concrete can also be textured with a stiff brush. Any crumbs of cement can be brushed off with a soft-bristled brush.

If you wish to carve and texture the rim it is necessary to pick the pot up at this point and turn it right side up. This can be a ticklish business, as the damp concrete is still quite tender and may crack. If the planter is a large one you

may need assistance in turning it over while it is still in this tender condition. Also, it will still be heavy with unevaporated water, which adds to the difficulty of handling it single-handed without breaking off a chunk of the rim. It is easiest to clean the drainage holes with the planter in an upside-down position after it has been taken off the mold.

It is quite possible to leave the planter in its upside-down position over the inner mold until it is completely set and dry. The plastic will peel away quite easily from the hardened concrete, and an awl or other sharp implement can be used to clear the drainage holes, which will be



5 Rim of planter is formed



6 Plastic sheet covers mold



7 Spreading concrete mixture



8 Wire support is embedded



9 Edges of plastic are lifted



10 Dowels form drainage holes



11 Bottom of planter is leveled

sealed on the inside of the planter by a thin skin of cement.

Once the planter is finished it should be loosely covered with a sheet of plastic or a dampened piece of heavy material such as burlap so that it will dry out slowly. The more slowly concrete cures, the stronger it will be. When it is completely dry, it should be left out in the rain to weather for a month or so, or it may be soaked for about two weeks in water which is changed every two or three days so that the free lime in the concrete will be leached out. (Most plants do not like to be in contact with fresh concrete.) It is also possible to immerse the pot for several days in a wine-colored solution of potassium permanganate (purchasable as crystals or tablets at the drugstore), which neutralizes the free lime.

Soil Mixtures

A grouping of real stones or of artificial ones made of the same mixture as the pot will enhance the appearance of a planting and create crevices for the roots of alpinists. The majority of plants will be happy in a good standard potting mixture of 1 part loam to 2 parts fine gravel or coarse sand and 2 parts leafmold or other humus. More gravel and less loam and humus in the mixture will make it suitable for desert lovers, while plants needing woodland conditions will appreciate more generous quantities of leafmold. Additional sphagnum peat moss or the duff from under pines, hemlocks, and oaks can be used for plants that require acid soil. Lime chips in lieu of ordinary gravel will make the mixture suitable for plants that need a limy soil. A light dusting of dried sheep manure and/or bonemeal added to the soil mixture will benefit most plants.

Because the quantity of the soil in a planter is necessarily limited, we prefer to fill the entire pot with an open but nourishing soil mixture rather than underlying a heavier soil with drainage material. Small pieces of aluminum or plastic screening—not copper, which poisons some plants—will keep the mixture from seeping through the drainage holes.



12 Cleaning out drainage holes



13 Planter is finished



14 Mugo pine growing in planter

It is most satisfactory to have the soil mixture quite dry when planting is done, as the particles will then sift easily among the roots and rocks and you are less likely to leave fatal air pockets. An unsharpened pencil will help work the soil into hard-to-reach crevices. Firm planting is important.

Once the pot has been planted, it should be well soaked so that the entire body of soil is wet through. A surface layer of gravel $\frac{1}{4}$ inch to $\frac{1}{2}$ inch deep spread around and among the plants after they are in place keeps the crowns dry (an important requirement for most al-pines) and prevents mudsplash on leaves and flowers.

Frequency of watering will depend on weather, the type of plants in the planter, the site in which it is kept, the soil mixture used, and the size of the container—a large one will need less frequent attention than a small one. It is important, if your planting is a mixed one, to use together plants that like the same habitat and to avoid putting in the same pot a robust grower and a small delicate treasure.

Fertilizing two or three times a year can be accomplished by watering with weak manure water or a water-soluble, preferably organic, plant food such as one of the fish emulsions. Do not over-feed, as this will make your plants gross or, in extreme cases, even kill them.

Displaying the Containers

In summer our planters are displayed on the low brick wall that surrounds the terrace and on pedestals of cement block that raise them to a level at which we can enjoy the small plants. In winter they are placed directly on the brick pavement of the terrace in an out-of-the-way corner where snow—if any—will pile over them and the plants will be somewhat protected from winds and sun and consequent desiccation.

A few of our planters are wintered over in the coldframe, where the late winter sun encourages early flowering to lighten the last dragging weeks of the season. These can be brought into the

house and placed on trays of pebbles for brief periods, but after a day or two they should be returned to the coldframe. Most hardy plants, particularly alpiners, become attenuated and would soon perish if kept very long in the comparatively dark, overheated, dry atmosphere of most homes. An unheated sun porch is an adequate, though not ideal, substitute for a coldframe.

Planters kept under cover in winter should be watered very sparingly, if at all, during the cold months when the plants are dormant, though they should not be allowed to dry out completely. As soon as the plants start into growth, however, they will require careful watering, particularly on sunny days. This should always be done in the morning so that the foliage can dry and excess moisture can drain from the pots before the temperature drops at night.

Containers for Indoors

It is, of course, perfectly possible to grow house plants in these containers so that they can be enjoyed in the house during the winter and enhance the terrace

during the warm months, but it is for the neat hardy plants from the wild places of the world that these naturalistic, frost-proof containers are especially appropriate.

Most rock plants and many of the small woodlanders and ferns thrive in these porous pots, and dwarf trees and shrubs find them an eminently suitable home. Such containers are particularly adapted to difficult alpiners from high altitudes, which require special growing conditions: the soil mixture is easily controlled and it is possible to move the pot to discover the best exposure for the health of the plants at different seasons.

A few deep-rooted plants such as *Aethionema* (Persian candytuft or stonecress) and *Armeria* (thrift) resent pot culture and will be short-lived in the restricted quarters provided by a container. And a few carpeting plants prefer a wider expanse of soil in which to root down as they spread. On the whole, however, gardening in such a planter is relatively trouble-free, and these miniature landscapes have a peculiar charm of their own. ♦



Anacyclus depressus has red flowers on stems 3 inches high.

Illustrations by Laura Louise Foster from *Rock Gardening: A Guide to Growing Alpines and Other Wildflowers in the American Garden*, by H. Lincoln Foster (Houghton Mifflin Co.)



Dianthus alpinus is a favorite rock-garden subject.



Draba dedeana is a miniature that grows only 2 inches high.



Miniature in scope rather than size of plants

A KITCHEN GARDEN FOR THE TERRACE

Dorothy Childs Hogner

NOT EVERYONE TODAY has space for a large or even medium-sized vegetable garden but just about all of us have terraces adjacent to our homes. Why not raise vegetables and culinary herbs in containers on the terrace—ready for use by the chef, who may pluck the leaves right off the plants and, bingo, into the pot or onto the food being barbecued! Of course, not all the herbs need be culinary. For variety's sake, include a few of the scented herbs like lavender and santolina. And don't think that only herbs are decorative. Many vegetable-type plants grown in containers are very effective, too.

Just a word about the terrace itself.

All of the plants discussed here need full sun for at least half the day. If you have a shady terrace, your kitchen garden will be limited to the various kinds of mints.

Soil, Fertilizers and Water

We use 1/3 soil, 1/3 peat moss and 1/3 sand and about a quart of dried sheep manure to each bushel of this mixture. The plants are fed with a fish emulsion plant food used according to directions on the bottle. (You may buy such fertilizers at supermarkets or garden centers.) We alternate this organic fertilizer with an inorganic, concentrated fertilizer (20-20-20), diluted according to directions on the bottle.

Watering is of the utmost importance. When the soil in the containers begins to dry out, water generously but not enough to keep the soil soggy. A special warning on hanging baskets: exposed as they are to the wind on all sides, they dry out amazingly fast. A good practice is to soak

Illustrations by Nils Hogner from *Gardening and Cooking on Terrace or Patio* by Dorothy Childs Hogner. Copyright © 1964 by Dorothy Childs Hogner. Used by permission of Doubleday & Co., Inc.

the whole basket in a tub of water about once a week, for a few minutes or as long as necessary.

Plants and Their Containers

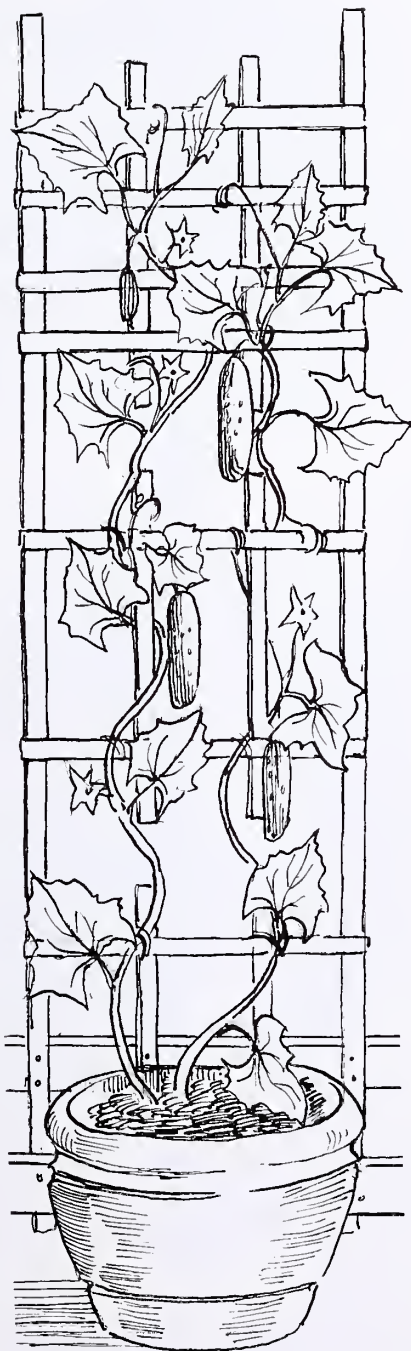
If you have a truly tiny terrace, there may be room for only a few herbs, as most vegetables, even in containers, take up a fair amount of space. Among the herbs that we have found to do well in a terrace garden are: tarragon, sweet bay (the true laurel), rosemary, mint, oregano, winter savory, sage, chives and thyme.

The first requirement for tarragon (*Artemisia dracunculus*) is a big, especially wide-mouthed container. A *terra rosa* ring pot, 12 inches in diameter and 10 inches high, or a redwood tub, 14 inches wide and 12 inches high, are good choices. Either of these containers will also suit a young sweet bay tree (*Laurus nobilis*) and rosemary (*Rosmarinus officinalis*). Mint (*Mentha spicata*) and oregano (*Origanum vulgare*), having a decumbent habit, grow well and look charming in a hanging wire or redwood basket. (If you use a wire basket or slatted redwood basket, it must be lined with sphagnum moss to hold the soil.) Sage (*Salvia officinalis*) does well in a wide-mouthed tub or pot. Winter savory (*Satureja montana*) looks pretty and grows very large in a 14-inch redwood tub.

Chives (*Allium schoenoprasum*) thrive in any fair-sized container that is about 8 inches across. Garden thyme (*Thymus vulgaris*) is equally accommodating and does well in a similar pot.

The plants mentioned so far are perennial, and while some can be grown from seed, it is most convenient to obtain them in the spring from nurseries and garden centers. The annual sweet basil (*Ocimum basilicum*) and biennial parsley (*Petroselinum crispum*) can be grown in pots (8 inches wide or more for the basil) or in window boxes or planters. Both grow readily from seed; or young plants can usually be purchased along with the other herbs mentioned above.

(Continued)



Cucumbers, large- or small-fruited, need a 12-inch pot and supporting trellis.



Mint plants of various flavors and aroma tumble luxuriantly from a redwood basket or other hanging container, provided the soil is rich and does not dry out. Oregano and nasturtium are two other possibilities for hanging baskets.

Vegetable Selections

Some of the vegetables with which we have had success in container gardening are tomato, cucumber, fennel and okra. The most effective way to raise tomato plants on a terrace is to place two plants in a good-sized tub (12 to 14 inches wide), prune each plant to two stems and set the tub next to a trellis about 6 feet high. As the stems grow, tie them to the trellis.

If you select pear or plum tomatoes or any of the small-fruited varieties like 'Lollipop', invite your friends to have cocktails on the terrace when the fruit is ripe. Provide a dip dish filled with coarse salt and finely chopped fresh basil leaves (also, of course, from your terrace kitchen garden) and another dish filled with a little olive oil. Then listen to the "ohs" and "ahs" of your guests as they pick the tomatoes off the vines, dip one end of each fruit lightly in the olive oil, then into the dish of salt and basil.

Grow cucumbers the same way as you do the tomato plants. The cucumber vines climb gloriously and produce large fruits, unless, of course, you choose some of the miniature-fruited varieties.

Sweet fennel (*Foeniculum vulgare*) must be planted in a very big, deep box or planter. The bulblike bases of the stalks do not make as succulent or satis-

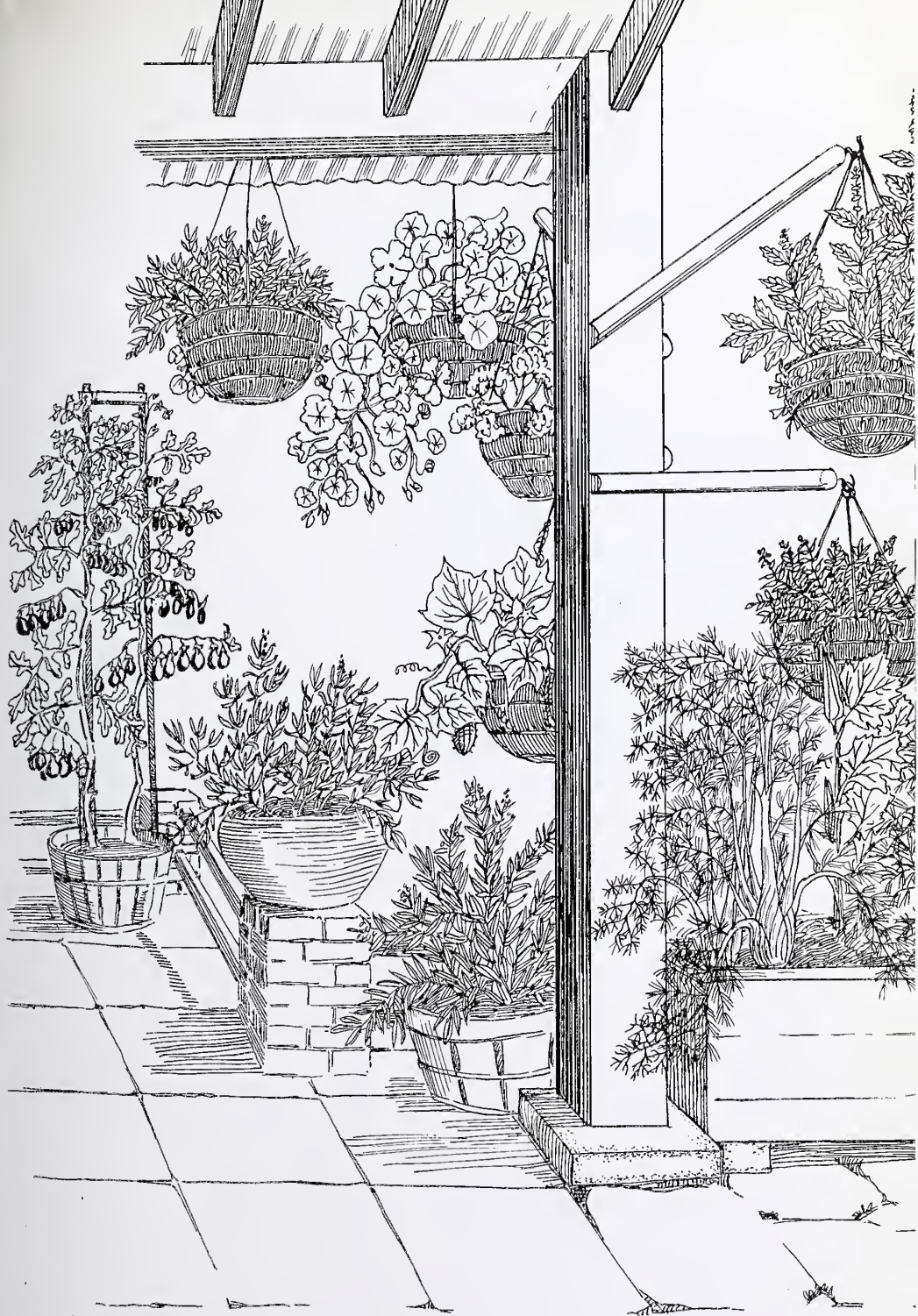
factory growth as they do when planted directly in rich, moist ground, but the plants produce a fine leaf growth. We use chopped fennel leaves to flavor fish and other dishes. Okra (*Hibiscus esculentus*) requires a similar container to that for fennel, as the plants have a bushy habit and may grow up to 4 feet in height. The blossoms of okra are beautiful.

When Winter Comes

In the North, bring both the rosemary and sweet bay indoors before frost strikes. The plants are winter hardy in mild climates.

With the exception of tarragon, you may also bring in the other perennial herbs. Keep them in a conservatory, greenhouse or big, sunny window. Otherwise, discard them or plant them in the main garden along with the tarragon. If you wish to grow a tarragon plant indoors during the winter months, it's best to start with a fresh plant from a nursery. Or take a division from a clump in the garden after the frost has caused the leaves to die. (The old potted plant from the terrace kitchen garden will be too tired after its summer in a container.)

Before the ground freezes, empty all other containers and their contents on the compost pile. If you must leave the pots outside, turn them upside down. ♦



Tubs, hanging baskets, pots and planters filled with herbs and vegetable plants decorate the terrace at the same time they provide fare for the questing cook.

*This replica of a medieval herb garden
features a center knot pattern*

THE MINIATURE HERB GARDEN

Alys Sutcliffe

A MINIATURE CONTAINER garden of herbs with its center in the form of a medieval "knot" is both charming and practical. In such a small garden, the "knot" is like an embroidered cushion, the soft grays and vivid greens of the living plants being attractive to the eye, soft to touch and emitting a light fragrance. The open spaces between the plants can be covered with bits of red brick or clay flower pots crushed very fine to give color and contrast to the green foliage of the plants. It was by the use of sand colored yellow, red and black and placed between the borders of necessary culinary and medicinal plants that medieval gardeners achieved the color in their gardens. These gardens were planted in valuable space in enclosures where there was no room for flowers.

In adapting the medieval herb garden to a container, there will be space for young plants of the most used herbs such as mint, thyme, parsley, tarragon and winter savory. Small shrubs of rosemary, lavender and the true myrtle can be added for fragrance.

The garden may be of any size desired. The container may be of wood or cement or could be an old iron sink if you can find one. Any material will do so long as the basic requirements of adequate drainage and of depth of not less than 5 inches are met.

The miniature garden described here is in a container made of wood about $\frac{3}{4}$ of an inch thick. The inside measurements are 30 by 20 by 5 inches. There are nine drainage holes one inch in diameter in the bottom; over each hole is a square of plastic screening, then a layer about one inch thick of coarse gravel spread over the entire bottom. Over this goes a soil mixture of two parts soil, one part sand and one part peat moss, with a measuring

cup of bonemeal and two handfuls of granulated charcoal added per bushel. After firming, the soil mixture should come to about $\frac{1}{2}$ inch from the top of the container.

A square 15 by 15 inches should be marked in the center of the container and the pattern of the "knot" outlined in it. (This particular knot garden design is from *The Gardener's Labyrinth* by Didymus Mountaine, Thomas Hill, 1571.) The little plants are put in close enough together to form solid lines following the pattern. The shiny leaves of a tiny boxwood contrast with the gray of *Santolina chamaecyparissus*; then come the vivid green of *S. virens* and the dull green of germander, *Teucrium chamaedrys*. All form a harmonious picture. (The numbers in the plan suggest how they can be arranged.)

Around the center panel a 2-inch-wide flagstone or gravel path may be laid. According to this plan there will be a 5-inch-wide border at each end; and since there is soil to a depth of 4 to 5 inches, the useful herbs mentioned above should do well. Some people may prefer just a hedge of lavender at each end; this would make the little garden one of more beauty than usefulness. Others may want plenty of mint for their iced tea or mint juleps, while others need parsley or tarragon for kitchen use. It is all a matter of taste!

Such a garden needs a little more care than some container gardens. It must be watered in dry weather, of course. Plants of myrtle and rosemary are not hardy in the colder parts of the country. One way to solve this problem is to keep them in $3\frac{1}{2}$ -inch clay pots which may be sunk to their rims in the soil of the container during the summer season. In late fall lift and move them indoors where they can be repotted if necessary and then treated as

house plants for the rest of the winter.

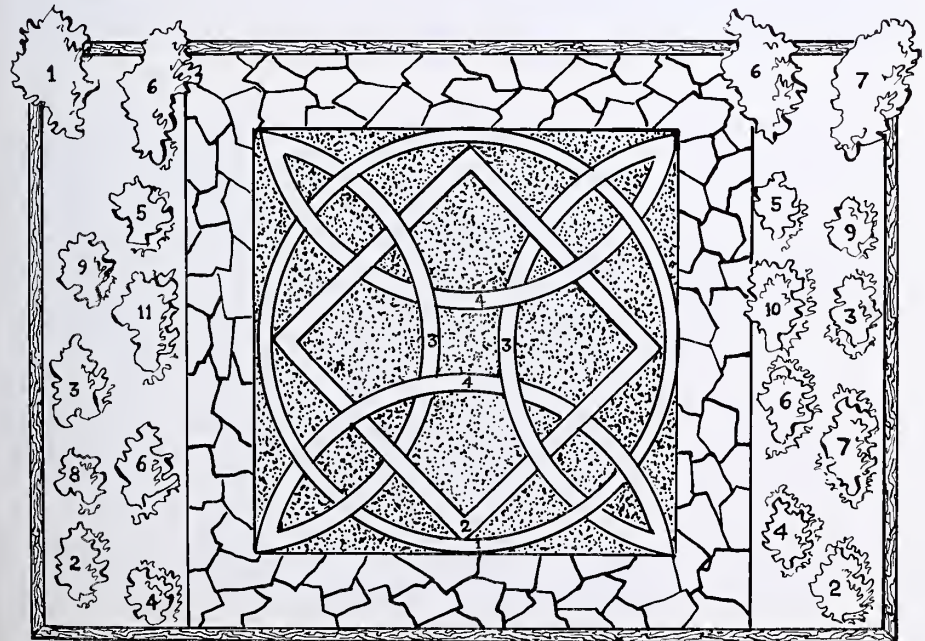
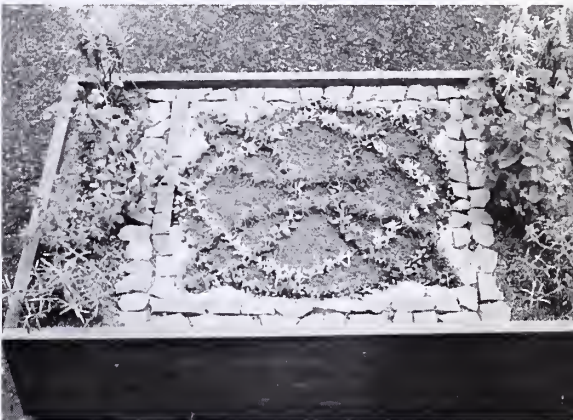
The little hedges forming the “knot” should be clipped to a height of 1 to 1½ inches; a sharp pair of seissors is ideal for this purpose. Seeds of some of the plants can be sown indoors in early spring for replacements. Tiny cuttings needed for replacements of other plants that form the “knot” should be made in

late summer and be wintered in a protected coldframe.

A little complete fertilizer in early spring is often beneficial. The garden should be done over every three or four years and the soil renewed. The same winter protection as is required for all the container gardens of hardy plants should be provided. (See page 63) ♦

The following plants were used to make the small herb garden (right).

- 1 Lavender (or substitute box-wood ‘Kingsville Dwarf’)
- 2 Creeping Rosemary (or substitute *Santolina chamaecyparissus*)
- 3 Myrtle (*Myrtus communis*)
- 4 *Thymus serpyllum* (Creeping Thyme)
- 5 *Thymus vulgaris* (Common Thyme)
- 6 Parsley
- 7 Tarragon
- 8 Winter Savory
- 9 Chives
- 10 Spearmint
- 11 Applemint

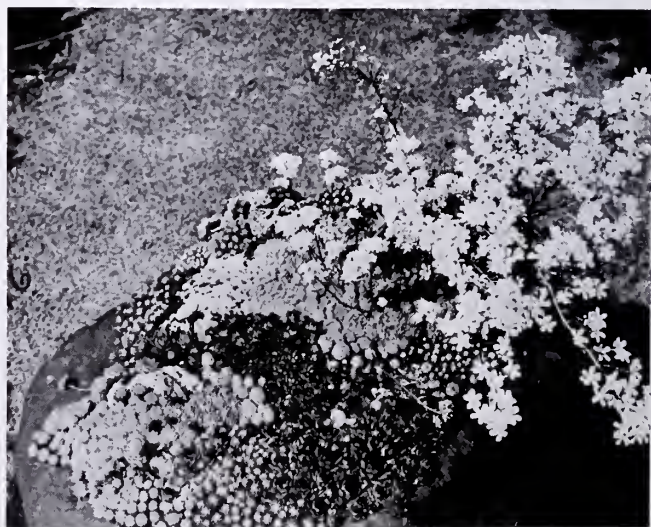




© Roy Elliott

Above: This primrose, *Primula marginata*, is a true midget, growing 4 inches high. Its flowers are lavender.

At right: A stone trough of sempervivums and in full bloom, a saxifrage.



Perennial plants grouped according to color . . .

100 HARDY PLANTS FOR MINIATURE GARDENS

Plants with White Flowers

1. *Achillea tomentosa nana* (Yarrow)—4 inches. Gray-green fern-like foliage rosettes. Flowers in summer. Average soil. Propagation: division and seeds.
2. *Anacyclus depressus*—3 inches. Dense mats of fine-cut foliage. Flowers often marked with red; attractive in bud. Well-drained alkaline soil (pH 7-8). Propagate from seeds sown in September.
3. *Arabis procurrens nana* (Rock Cress)—6 inches. Dark green mats of foliage. Endures light shade. Well-drained, neutral soil. Propagate by division or seeds.
4. *Arenaria montana* (Sandwort)—5 inches. Large drooping flowers. Gritty soil.
5. *Arenaria verna caespitosa*—1 inch. Tight mat of grassy foliage. Small flowers have violet scent. Neutral soil. Propagate by division in fall.
6. *Armeria juniperifolia* (Sea-thrift)—2 inches. Gritty, limy soil (pH 7-8). Propagate by division, cuttings or seeds.
7. *Bellium bellidioides*—4 inches. Miniature daisy with mats of deep green leaves. Flowers all summer. Well-drained, gritty and limy soil. Needs winter protection in north.
8. *Dicentra cucullaria* (Dutchman's-breeches)—10 inches in rich soil; 4-inch height possible in leaner soil. Gray, divided foliage. Endures shade. Divide in July.
9. *Draba dedeana*—2 inches. Rosettes of gray, hairy leaves. Well-drained soil.
10. *Dryas octopetala*—3 inches. Leaves form evergreen carpet. Sun or part shade; good well-drained soil with leafmold. Propagate by cuttings.
11. *Dryas octopetala tenella*—2 inches. Smaller form of above.
12. *Goodyera pubescens* (Downy Rattlesnake-plantain)—12-inch flower spikes make this plant too tall for most miniature gardens but when cut off, remaining low green-and-white leaf rosettes are suitable. Acid, leafmold soil in shade.
13. *Goodyera repens* (Lesser Rattlesnake-plantain)—Less white netting in leaves.
14. *Gypsophila cerastioides* (Baby's-breath)—3 inches. Little tufts. Well-drained soil (pH 6-8). Needs winter protection in North.
15. *Hutchinsia alpina*—2 inches. Well-drained, limy, gritty soil (pH 7-8). Divide in March.
16. *Nierembergia rivularis* (White-cup)—2-inch carpet of deep green leaves. Stemless white flowers have yellow eyes. Rich, moist soil in partial shade. Winter protection in north. Divide in spring.
17. *Oxalis magellanica*—2 inches. Mat of bronzy-green, cloverlike leaves. Needs cool situation in light, leafy soil. Divide in April.
18. *Rhodohypoxis platypetala*—2 to 3 inches. Grass-like foliage. Sandy leafmold. Division.
19. *Saxifraga bucklandii*—3 inches. Neat, green foliage rosettes. Acid, leafmold soil.
20. *Saxifraga valdensis*—3 inches. An encrusted saxifrage; forms tiny gray cushions of minute leaves. Flower stems are red, 1 inch high.
21. *Thymus serpyllum albus* (Thyme)—4 inches. Minute creeper. Average soil. Division.

Plants with Pink, Rose or Red Flowers

22. *Androsace languinosa* (Rock Jasmine)—2 inches. Tufted rosettes with trailing stems that have silver-green leaves; rose flowers. Well-drained soil. Plants must not suffer from drought. Propagate all kinds by seeds, cuttings and division. Variety 'Oculata' has pink flowers with dark eye.
23. *Androsace sarmentosa chumbyi*—3 inches. Silver, woolly foliage rosettes; pink flowers. Variety 'Watkinsi' has large green foliage rosettes; bright rose-red flowers.
24. *Antennaria dioica rosea* (Pussy-toes)—2 inches. Tufts of gray leaves in tight mats; a good carpeter. Fluffy pink flowers. Average soil. Divide in summer.

25. *Armeria juniperifolia rosea* (also listed as *A. caespitosa*)—2-3 inches. Spiny green cushions; nearly stemless pink flowers. Well-drained soil.
26. *Dianthus alpinus* (Pink)—3 inches. Green foliage; rose flowers. Well-drained, gritty, limy soil in sun or light shade. Plants must not dry out. Increase by division, cuttings. *Dianthus* hybrids of unknown origin include 'Mars', 3 inches, with double crimson flowers; 'Tiny Rubies', 3 inches, tufts of gray leaves and sweet-scented ruby-red flowers.
27. *Douglasia montana*—2 inches. Tufted foliage; bright rose-pink flowers. Needs lime soil and partial shade. Divide in late summer.
28. *Erodium chamaedryoides roseum* (Heron's-bill)—3 inches. Creeper with scalloped green leaves; pink or red flowers. Partial shade. Needs winter protection.
29. *Frankenia thymifolia*—1 inch. Thick mats of gorse-like leaves. Bright rose-pink flowers. Poor, lime soil in sun. Not hardy. Take cuttings of green wood in spring.
30. *Geranium sanguineum prostratum* (often listed as *G. lancastricense*) (Cranesbill)—3 inches. Cut-leaved, prostrate habit. Flowers true pink. Average soil. Divide in fall.
31. *Penstemon rupicola*—4 inches. Prostrate shrub; glowing red flowers in summer. Poor, dry soil in deep rock crevices; partial shade.
32. *Polygonum vaccinifolium* (Knotweed)—5-6 inches. Trailer with oval, pointed leaves; rosy flower spikes in late summer. Average soil. Needs winter protection in north.
33. *Primula clusiana* (Primrose)—6 inches. Narrow, sharp-pointed leaves; rich crimson flowers. Well-drained, humus-rich soil. Readily grown from seed but difficult plant to flower.
34. *Primula frondosa* (Bird's-eye Primrose)—6 inches. Mounds of silvery leaves; rose-pink flowers. Moist, gravelly soil in light shade. Seed (it self-sows) and clump division are usual methods of propagation.
35. *Saxifraga aizoon rosea*—3 inches. An encrusted saxifrage. Low foliage rosettes; pink flowers on 8-inch stems. Well-drained, gritty soil and semi-shade.
36. *Saxifraga arco-valleyi*—1-2 inches. A hybrid. Dwarf tuft of gray leaves; shell pink flowers.
37. *Saxifraga irvingii*—1 inch. A hybrid. Mats of gray-green foliage. Pale pink flowers with deeper eye in early spring. Needs lime in its soil.
38. *Saxifraga jenkinsii*—1 inch. A hybrid. Mats of gray-green foliage. Pale pink flowers with deeper eye. Free flowering. Propagate by division.
38. *Saxifraga media*—3-4 inches. Incurved, overlapping neat, gray leaves. Crimson stems and flowers.
40. *Saxifraga moschata* 'Mme. Pompadour'—3 inches. Small mounds of mossy, dark green leaves; red, cup-shaped flowers. Partial shade. Gritty, well-drained soil.
41. *Saxifraga umbrosa primuloides rubra*—3 inches. Small, neat. Pink flowers.
42. *Sedum sieboldii* (Stoncrop)—6 inches. Red-edged leaves; brilliant pink flowers in late summer. Average soil and sun.
43. *Thymus serpyllum coccineus* (Thyme)—2 inches. Creeper with crimson flowers.
44. *Veronica rupestris rosea*—3 inches. Trailer; short spikes of rose flowers. Average soil.

Plants with Yellow or Orange Flowers

45. *Achillea tomentosa aurea* (Yarrow)—6 inches. Dark green mats. Yellow flowers.
46. *Anthyllis vulneraria* (Woundwort)—1-4 inches. Prostrate habit. Yellow flowers in summer. Lean, gritty soil.
47. *Chrysogonum virginianum* (Gold Star)—4 inches. Spreading mats of yellow flowers. Moist soil, partial shade.
48. *Cotyledon chrysantha* (also listed as *Sedum chrysanthum*)—3 inches. Small rosettes of velvet leaves; creamy yellow flowers. Average soil, sun.
49. *Cotyledon simplicifolia*—5 inches. Round leaves. Tubular yellow flowers on arching stems.
50. *Douglasia vitaliana praetutiana*—1-2 inches. Small cushions covered with stemless yellow flowers. Well-drained, lime (pH 7-8) soil.
51. *Draba bryoides imbricata*—2 inches. Tight, compressed rosettes of foliage; yellow flowers. Well-drained soil and sun.

52. *Draba mollissima*—2 inches. Silver gray leaves; golden flowers. Choice.
53. *Dryas drumondii*—3 inches. Prostrate shrubby evergreen. Golden flowers.
54. *Erigeron aurantiacus* (Double Orange Daisy)—10 inches. Orange flowers in August.
55. *Genista sagittalis*—4 inches. Winged leaves; gold flowers in May. Dry soil.
56. *Geum montanum* (Avens)—8 inches. Bright gold flowers. Increase by seeds, division.
57. *Geum reptans*—3 inches. Runners with toothed leaflets; large yellow flowers.
58. *Geum* 'Waight's Brilliant'—3 inches. Hybrid. Compact. Orange-red flowers.
59. *Hypericum rhodopeum* (St. Johnswort)—4-6 inches. Gray leaves; a cascade of yellow flowers. Increase by cuttings.
60. *Hypericum yakusimanum*—1 inch. Very dwarf. Small golden flowers.
61. *Lysimachia japonica minutissima*—1 inch. Tiny, tight mat of neat, green leaves; stemless, starry yellow flowers. For moist soil.
62. *Lysimachia nummularia* (Moneywort)—2 inches. Vigorous creeper. Round leaves; yellow flowers. Increase by division.
63. *Morisia monantha*—2-3 inches. Glossy rosette of dandelion-like leaves; yellow starry flowers. Light, sandy soil. Propagate by root cuttings.
64. *Oenothera perennis* (also listed as *O. pumila*)—6 inches. Golden yellow flowers. Sandy or average soil. Division or seeds.
65. *Potentilla verna nana*—2 inches. Mats of neat foliage; gold flowers in spring. Average soil.
66. *Saxifraga apiculata*—4 inches. Spreading mats of tiny leaves; primrose-yellow flowers in spring. Needs protection from hot sun. Division.
67. *Saxifraga diapensoides lutea*—2 inches. Small bluish foliage rosettes; yellow flowers. Protect from hot sun.
68. *Saxifraga elizabethiae*—2 inches. Spiny green leaves in mats. Yellow flowers. Protect from hot sun. Propagate by cuttings.
69. *Sedum acre* (Stonecrop)—4 inches. Creeper. Yellow flowers.
70. *Sedum sexangulare*—2-3 inches. Mat-forming creeper. Yellow flowers.
71. *Viola rotundifolia* (Round-leaf Violet)—2-4 inches. Prostrate habit. Bright yellow flowers with brown stripes.

Plants with Blue and Purple Flowers

72. *Bellis rotundifolia caerulescens*—3 inches. Lavender daisies. Neutral soil in partial shade. Propagate by division in July.
73. *Campanula elatines fenestrellata* (Bellflower)—3 inches. Heart-shaped leaves in tight tufts; masses of China blue, starry flowers. Prefers sunny rock crevices or light soil in sun. Propagate by cuttings of green wood in August.
74. *Campanula elatines garganica*—4 inches. Profusion of little blue star-shaped flowers. Same culture as above.
75. *Campanula poscharskyana*—4 inches. Prostrate stems. Starry blue flowers.
76. *Campanula pulla*—2-6 inches. Flowers are nodding blue bells. Gritty soil in sun or semi-shade. Divide in September.
77. *Campanula raineri*—3-4 inches. Solitary flowers of deep violet. Light, gritty soil. Divide in May.
78. *Campanula wockii*—4 inches. Neat habit. Up-turned starry violet flowers. Needs a light soil and some sun. Propagate by division in April.
79. *Conandron ramondiioides*—4 inches. Rosettes of crinkled, lettuce-green leaves; star-shaped lilac flowers. Shady position in neutral soil. May need winter protection. Propagate from seed sown inside in February.
80. *Cymbalaria aequitriloba*—1 inch. Tiny creeper; violet flowers. Well-drained, gritty soil. Not hardy. Self-sows; since seeds are not always true to type, cuttings or division are recommended.
81. *Erinus alpinus* 'Dr. Hanelle'—3 inches. Bright green leaves; tiny red-purple flowers. Well-drained soil; sun. Propagate by division.
82. *Gentiana acaulis*—1 inch. Rosettes of foliage, forming mats; large, intense blue flowers. Rich, acid soil of loam and peat moss. Partial shade.
83. *Gentiana altaica*—4 inches. Tufted habit; deep blue flowers. Gritty soil.

84. *Gentiana angustifolia*—4 inches. Flowers are brilliant sapphire trumpets.
85. *Globularia cordifolia*—2 inches. Mats of evergreen leaves; blue flowers. Well-drained soil and sun.
86. *Hepatica americana*—4 inches. Early flowering plant of woodland. Olive green leaves; violet flowers. Rich woodland soil. Seeds; division.
87. *Houstonia caerulea* (Bluets)—3 inches. Clumps of little starry blue flowers in spring. Moist soil; partial shade. Propagate by division in March or cuttings in May.
88. *Lithospermum diffusum* (also listed as *L. prostratum*)—6 inches. Evergreen trailer; deep blue flowers. Deep soil of acid leafmold and sand. Usually needs winter protection.
89. *Mentha requienii*—1-2 inches. Small carpeting plant with strong peppermint fragrance; tiny mauve flowers. Grows in shade. Not usually winter-hardy in north. Propagate by seeds, cuttings or division.
90. *Primula juliae* 'Wanda'—3 inches. Evergreen foliage; deep purple flowers. Division.
91. *Primula marginata*—4 inches. Violet flowers. For sunny crevices and lime soil. Propagate by cuttings in July.
92. *Thalictrum kiusianum*—3 inches. Fern-like foliage; mauve flowers. Moist, acid soil and partial shade. Divide in March.
93. *Thymus herba-barona*—3 inches. Prostrate habit. Dark green leaves, caraway-scented. Purple flowers.
94. *Veronica armena*—3 inches. Dainty trailer. Bright genitan-blue flowers.
95. *Veronica filiformis*—1 inch. Mat-forming habit; mauve flowers. May become invasive.
96. *Veronica pectinata*—2 inches. Evergreen mat of woolly leaves. Short spikes of blue flowers in early spring.
97. *Veronica repens*—1 inch. Creeping stems; pale blue flowers. Light shade.
98. *Viola labradorica*—3 inches. Purple leaves; blue flowers.
99. *Viola pedata* (Bird's-foot Violet)—4 inches. Tufts of finely-divided foliage; large bi-colored purple and blue flowers. For sandy, acid soil.
100. *Wahlenbergia saxicola*—3 inches. Dainty habit, blue bell-shaped flowers.



© Roy Elliott

Dianthus neglectus, a small plant with crimson flowers and a paler "eye."

A rose garden is possible in very limited space with

MINIATURE ROSES

Margaret E. Pinney

A YEAR-ROUND CONTAINER garden of miniature roses is more likely to find a place in the city garden or close-in suburban garden, where space is at a premium, than it is in the country. This is also true of the small, paved patio garden where the flowers must be grown in pots or boxes, movable or fixed. In either city garden or terrace area the holders of plants can be grouped to the best advantage for growing and for beauty.

Containers for miniature roses may be anything from small pots through jardinières and boxes to a long window box or other type of planter running the length of a terrace. They may be of any shape or size that fits the surroundings or the owner's pleasure. They may be of uniform material, color and design or may be a hodgepodge, depending on the formality of the setting. However, from the decorative point of view, harmony of color and material, although not necessarily of shape, makes for the best setting for the plants.

A few rules must be taken into consideration in choosing containers. Materials which rot or rust readily should be avoided. Clay, redwood, red cedar, cement, or wood covered with rot-resistant paint will not require constant replacement. Even plastic containers may be used, although for many plants plastic is not ideal.

Problem of Drainage

The next thing to consider is drainage, a must for every plant and especially for miniature roses. Water collecting in the bottom of an undrained container is a primary cause of root rot. Drainage holes in the bottoms of receptacles are essential. In an undrained container large

enough to hold a pot or pots, a couple of inches of coarse pebbles will give good drainage, provided that standing water cannot encroach on the pot bases. Containers with drainage holes should also have a layer of small crocks at the bottom, covered with a little coarse material such as sphagnum moss to prevent soil from sifting out. Containers should also be deep enough to prevent too-quick drying of soil and should have enough weight to prevent being blown over in windy locations.

Cultural Requirements

And now let us turn our thoughts to the miniature roses that are to flourish in the containers. If their demands are



Star Roses

White 'Pixie' is one of smallest roses.



Half a dozen varieties of miniature roses can be displayed in a porch box (as shown) or a planter, window box or other well-drained container not too large.



Miniature roses are effective as a foreground planting (most are under 12 inches in height) in any garden location which receives 5 or more hours of sun daily.

properly considered, these little shrubs will give a long, long season's bloom. Their requirements—sun, soil, water, food, disease protection and ultimate winter protection—are not many.

Five or six hours of sunlight a day are adequate; so if you have morning or afternoon sun only, you need not despair.

Soil is a really important matter, and one not always considered enough in the welfare of pot plants. A good formula for miniature roses is:

- 5 pounds of potting soil
- 1 pound of parakeet gravel which contains charcoal
- 1 cup of dehydrated cow manure
- 2 tablespoons of bonemeal

If you want to do the best for your plants, a more or less regular feeding schedule is desirable. Fish emulsion, although a little odorous when applied, is a natural food, and in addition is absolutely pheasant-under-glass and champagne for house plants. Other commercial foods such as Hyponex and Ra-Pid-Gro are good, too. Always measure carefully and make solutions exactly according to directions. Feed every ten days or two weeks when the plants are growing rapidly, about every three weeks when growth slows down.

Careless watering, I feel, is the cause of most failures with miniature roses. Roses should never be allowed to stand in water for any length of time, but it is more important that they should never be allowed to become really dry. On a hot, sunny or windy day, it may be necessary to water them twice.

Disease protection must be carried out as for all roses, although in a rooftop garden or protected patio there is less chance of invasion by bugs and diseases. Spray at first sight of trouble with a good all-purpose rose spray but the best prevention is to spray at regular intervals (every ten days or so) as well as after every rain. Pick off all dead and diseased leaves immediately and remove any leaves lying under the plants.

A mulch is very desirable against both hot, drying summer winds and cold, freezing winter ones. This should be of

material that is both permeable by water and heavy enough to stay put. Peat moss mixed with gravel or sand, wood chips, sphagnum moss (not ground sphagnum) or other mulching material should be applied loosely around the plants to a depth of about one inch.

Winter protection in a cold and windy spot presents its own problems. In a comparatively mild climate, many people give their miniature roses little or no covering. But where the mercury goes to 20 degrees or more below zero and where frost penetrates the ground below root level, and particularly when freezing winds howl, protection must be given after cold weather arrives to stay.

The best blanket is evergreen boughs pushed down gently among the plants and lightly weighted or tied to prevent their blowing away. Failing this, hill up the plants lightly for 2 or 3 inches with equal parts of mixed peat moss and bird gravel. In extremely windy spots the roses will certainly be happier with a hedge or other windbreak.

More Plants from Cuttings

Propagation of most miniature roses is not hard if you have patience. Put drainage in a wide pot and fill it to within an inch of the top with equal parts of chopped sphagnum moss and bird gravel. Soak thoroughly, drain, and set in a saucer in the shade. Cut 2-inch sections of hard but green rose stems just below a node, slantwise. Trim off any leaves that might touch the earth when planted, dip the bottom ends of the cuttings in rooting-hormone powder, shake off the excess and plant firmly in the pot against the side. Cover tightly with a clear plastic bag, and wait. Don't water unless the soil becomes really dry.

In a few weeks, depending on many things such as variety, time of year and the unpredictable cussedness of roses, you will, exploring *carefully*, find thick white roots protruding from the buried node. Plant—with the utmost care not to injure the roots—in a small pot of potting soil, keep quite damp and out of the sun for a week or so, and you have a new plant. ♦

A DESERT TRAY GARDEN OF CACTI AND SUCCULENTS

This miniature garden has a built-in system to eliminate the hazards of over- or under-watering

George Kalmbacher

A TRAY DESERT GARDEN of succulents and cacti can be an unusual exhibit and a personal expression with all sorts of possibilities, depending on one's imagination and the plants used. While it is usually larger than the well-known dish garden, it is still miniature in scale and permits more variety in plant selection and greater freedom of arrangement. When compared with miniature gardens of more delicate plants, the desert garden can be maintained with a

remarkably small amount of care. One can go away on a month's vacation after giving it a good watering at departure, and return to find it in good order. There is one fundamental requirement: sun or very bright light for at least 6 hours daily.

Such a tray garden may be limited to cacti or to other succulents, but most enthusiasts prefer a combination of both kinds. It is advisable when the two groups are used that each be clustered in



its own part of the tray garden, because during the year the watering regimen may differ for the two. Also, if in winter a heat differential is possible, the cacti should be kept nearest the cold window glass, the other succulents oriented toward the warmer part of the room. The cacti can be separated from the other succulents by a simulated path or stream bed. If the latter, large pebbles can be used suggestively, some making small ledge drops for miniature waterfalls.

The landscape should not be flat. Interesting stones of varying sizes and shapes and attractive colors can be placed judiciously to make the garden more pleasing to the eye.

Soil and Plant Selection

The plants selected should be slow-growing kinds. The ball types of cacti such as *Mammillaria*, *Gymnocalycium*, *Coryphantha* and *Notocactus* are very

The tray garden (opposite) is planted with the following cacti and succulents:

1. *Lobivopsis* 'Red Riding Hood'
2. *Copiapoa humilis*
5. *Gymnocalycium bruchii*
3. *Oreocereus hendricksonianus*
4. *Coryphantha daimonocera*
6. *Mammillaria multiceps*
7. *Mammillaria elongata*
8. *Gymnocalycium gibbosum*
9. *Mammillaria parkinsonii*
10. *Espostoa lanata*
11. *Gymnocalycium deesizianum*
12. *Lobivia carminantha*
13. *Astrophytum asterias*
14. *Sedum dasyphyllum*
15. *Huernia pillansii*
16. *Gasteria lilliputana*
17. *Euphorbia loricata*
18. *Pleispilos bolusii*
19. *Haworthia ramosa*
20. *Echeveria gilva*
21. *Haworthia tortuosa*
22. *Echeveria weinbergii*
23. *Crassula obliqua variegata*
24. *Euphorbia tetragona*
25. *Aloe brevifolia*

desirable because of their slow growth. Choose 2-inch-pot sizes when ordering from a grower. Some dealers specialize in collected plants; these should be avoided for tray gardens. It is the seedling plants that are desirable.

Among the other succulent plants which are useful for the desert tray garden are a number of kinds of *Haworthia*, the ball-shaped *Euphorbia*, small *Gasteria* and the stone imitators, *Pleiospilos*. To avoid the monotony of too many of the ball-shaped kinds, choose some of the small columnar types of cacti and other succulents that are slow growing.

The container or tray for the desert garden should be leakproof and between 4 and 5 inches deep and about 10 inches wide by 15 inches long. (A larger or slightly smaller container about 4 inches deep can be used.)

A tray without drainage holes will be the easiest to handle and display indoors. To compensate for the lack of drainage, fill the bottom with grit or gravel 1½ inches deep and keep it filled with water to the 1¼-inch level except in winter. On top of the grit or gravel is placed about 2½ inches of the following moistened mixture: 2 parts loam, 1 part peat moss, 1 part washed sand, ½ part bone meal, ½ part cow manure (Bovung or other kind of dehydrated manure). The cacti and other succulents are then planted in this mixture. The surface can be covered with ¼ inch of aquarium gravel.

Watering

At planting time, a good-sized stone that is wide at one end and tapered pronouncedly toward the other end should be placed in one corner of the tray. It should extend down through the various layers of material—to the very bottom. After the stone has been fitted in so it can be taken out and replaced easily, the sides of the hole (which should taper inward like the sides of a funnel) should be packed so they will remain firm. The stone can be removed at any time to enable one to see how wet the soil mixture is and whether there is sufficient water at the bottom of the tray. (Continued)

After the planting, apply enough water to nearly reach the top of the gravel layer. In summer, water the average tray garden about once a month, adding enough water at that time to bring it up to the 1¼-inch "water table." In the winter, only light watering may be required (not more than once a month) on the cactus side; perhaps as often as every two weeks for the succulent section. In a

dry, warm apartment or home, the plants will require more water than in a cool or cold room. Temperatures should not go below 40°F.

A desert tray garden can last for several years. The only attention necessary beyond the occasional watering will be substituting plant material as needed and seeing that it does not lack for sun or very bright light. ♦

Roche

Two other kinds of miniature desert gardens: The three saucer-shaped bowls (right) of cacti and succulents decorate a terrace and can be moved indoors for winter months in cold climates. The various kinds of succulents (below) in this small planter thrive in a well lighted window.



A SMALL WILD FLOWER GARDEN FOR THE CITY

*Well-chosen woodland natives will thrive
in a container if their needs are met*

Alys Sutcliffe

FOR A CITY DWELLER with a terrace, a small wild flower garden is a joy. A simple container can be made of 1 x 4 boards to fit whatever space is available where there is good light (but not too much direct sunlight) and good air circulation.

For the box a width of at least 12 inches is desirable, but 24 inches is even better. The length may be from 30 to 60 inches, or even more if space permits. The minimum depth should be from 6 to 8 inches; make the box deeper if it is quite long.

It is desirable to raise the planter box slightly from the pavement to assist drainage; 2 to 6 stout strips of wood set crosswise under the box will do this. Drill drainage holes in the bottom of the box about every 6 inches, and line the bottom with aluminum or plastic screening. Place a generous layer of coarse peat moss or rotted leaves in the box, then add a soil mixture of equal parts of sand, soil and peat moss.

In planting, arrange the garden with an eye to how it will be viewed—from above. Lay out a path to be carpeted with gravel or crumbled pine needles, or use bits of rock to arrange a dry stream bed or a rocky slope or ledge. (Use rocks that are appropriate to a woodland, avoiding beach pebbles and obviously artificial materials.) Don't overlook the value of clumps of moss and lichens and tree bark.

Choose woodland plants that are generally found together in nature. Seedling hemlocks or pines can often be found at the edges of woods, or may be available from nurseries. Most other wild plants should be purchased from a nursery; they will have been propagated from seed or cuttings and will be much easier to establish than collected plants. (Many wild plants, too, are protected by conservation

laws and must not be removed without permission from the owner of the property.)

Here are some plants suggested for the small wild flower garden:

Rattlesnake orchid (*Goodyera pubescens*) has rosettes of white-veined leaves that are attractive even without its small white flowers carried on 8- to 12-inch stems in early summer.

Partridge-berry (*Mitchella repens*), an evergreen creeper with white flowers followed by red berries.

Wintergreen (*Gaultheria procumbens*), with creeping underground stems sending up shoots a few inches high. White flowers are followed by red berries.

Trailing-arbutus (*Epigaea repens*), with very fragrant white or pink flowers in early spring. It is evergreen, hence needs shade. If it receives much sun, protect with dried leaves in summer.

Pipsissewa (*Chimaphila maculata*), with shoots a few inches high bearing dark-green leaves, mottled along the veins. Pinkish-white, fragrant flowers.

Blueets (*Houstonia caerulea*), a tiny plant with lavender to white flowers. Plant along edges of the garden. This plant requires more sun than most of the plants and a soil that does not dry out.

In nature, it is usually found in meadows or quite open patches of woodland.

Creeping snowberry (*Chiogenes hispidula*), a dainty, creeping ground-cover plant.

Birdseye primrose (*Primula farinosa*), one of the smallest primroses, but not native to North America. *Primula juliae* and its varieties are also suitable for small gardens.

Ebony spleenwort (*Asplenium platyneuron*), a small rock fern. ♦

AN INDOOR WOODLAND GARDEN AND TERRARIUM

Alys Sutcliffe

A WOODLAND GARDEN is perhaps the easiest and the least expensive of all the small gardens for the average person to make. It has been known for years in the form of the terrarium, a glass container with a separate sheet of glass as a lid, into which are planted mosses, lichens, and the many small and attractive plants found in American woodlands or along country roadsides. These containers vary from the oversized "brandy snifter," which is very popular, to round glass bowls or jars with flat sides or the ordinary, oblong fish tanks.

For an indoor garden, it is almost essential to use such a container so high atmospheric humidity required by most woodland plants can be maintained. The average house with central heating is far too hot and dry for these woodland members of the plant world.

The ordinary aquarium is the easiest container to landscape effectively. There are many sizes procurable in pet shops; one that is 10 by 20 inches is a good size. A tank smaller than this may be used, but then it is more difficult to keep the landscape in proper proportion, a point always to keep in mind if the miniature garden is to be successful. It is possible to buy, have made or even to construct at home a long, narrow glass-walled case that will fit a window sill.

As in the creation of all kinds of gardens, there should be some sort of basic plan at the start—a stretch of path through the woods, a bit of cliff to which some evergreens and moss may cling or the dried-up bed of a small stream—anything that intrigues the eye and makes one wish to take the garden home.

The plant material should be chosen with a certain amount of care and with



This terrarium faithfully reproduces the effect of rolling terrain of most forest floors.

the finished product in mind. don't just acquire the plants in a haphazard fashion regardless of whether they will be used or not. Conservation rules and laws, if any, should always be considered when collecting wild flowers. Unfortunately, many areas, particularly on the outskirts of big cities, are being bulldozed to make way for housing developments, thus putting an end to most native plants in the area. Don't hesitate to collect plants from such land. And, of course, others can be obtained from nurseries that specialize in growing them.

When collecting, take along a supply of kitchen plastic bags, cartons or baskets to hold the plants and a firm trowel for digging them up. Choose small, compact specimens and seedlings of such trees as pine, hemlock, juniper, birch, beech, maple and oak. If the tree seedlings are small, it is easy to lift them with sufficient roots to ensure healthy growth in the terrarium. The variegated foliage of pipsissewa and rattlesnake plantain, the gray rosettes of pussy-toes and partridge-berry with its bright red berries are some of the treasures that give color in winter to the small woodland scene. The different lichens found on pieces of bark and dry, sandy banks also add variety with their soft colorings of gray-green.

The best location in the house for a terrarium is a north or preferably an east window. Too much sunlight is bad for most of these shade-loving plants. It is also apt to cause excessive condensation on the glass. When this condition occurs, lift the cover for a short time to permit more air to enter the terrarium. Also wipe off the moisture on the inside.

The soil to be used may be collected along with the plants and will be chiefly of leafmold and sand. As a partial control for insects which might become a nuisance, some growers feel that tobacco dust mixed with the soil may be helpful. A small amount of charcoal, which helps to keep the soil in good condition, may also be added. If woodland soil is not available, I have found that a mixture of peat moss (2 parts) and sand (1 part) makes an adequate substitute; it also has

the advantage of being entirely free from insects and diseases. The sand allows air to enter and provides drainage while the peat moss holds moisture. Plants will grow in such a mixture for several years.

The first step in planting is to put about 2 inches of the mixture into the container. If the right amount of sand has been incorporated, I have found it unnecessary to provide extra drainage in the bottom; watering has to be done with care anyway. Taking appropriate-sized stones that have been collected, form your cliffs, banks or the outline of a stream. Sometimes the little trees have to be planted at the same time as the rocks are put in place to be certain that their roots are well covered with soil. This part of the arrangement is the important background for the finished landscape.

Sometimes a group of plants is used—sometimes a single pine on a rocky cliff is more effective. Creeping mosses are used to carpet the ground in some sections; or pine needles, if broken up to keep them in proportion to the rest of the miniature landscape, may be used. They may also define a foot path. Gravel and sand are used for the bed of a stream. The rest of the planting is carried out always with thought as to how the plants grow and look in the wild. For instance, pussy-toes (*Antennaria*) inhabits open, well-drained places, as do most of the lichens. Violets, partridge-berry and ferns are found in more shaded areas.

After all the planting has been completed, enough water to settle the soil around roots should be added. Remember, though, that there is no outlet for superfluous water, so don't add so much that the plants are subjected to boggy conditions. A syringe-type sprayer can be used to advantage. It will wash soil off the foliage and help settle the entire planting. Wipe off the inner and outside glass with a clean cloth. The glass covering on top of the terrarium can be put in place a day after planting. It should be partially opened occasionally for humidity control. A well balanced terrarium, after its initial watering, rarely, if ever needs additional water. ♦



Don Normark

George Schenk's miniature gardens show

THE JAPANESE INFLUENCE

FOUR YEARS AFTER PLANTING, a tray landscape designed by George Schenk and owned by Constance Raphael, of Seattle, Washington, shows the influence of bonsai in its plant arrangement.

Mr. Schenk, a landscape architect and nurseryman who lives on the West Coast, planned and planted this miniature scree (technically a *bonkei*) with alpine plants from several regions of the world. It is kept outdoors most of the time, but the owner brings it indoors to enjoy each plant as it comes into bloom.

In the background is *Leiophyllum buxi-*

folium. In the middle ground (left to right) are *Cyathodes fraseri* and *Viola yakusimana* (both in flower), three specimens of *Chamaecyparis pisifera* 'Pygmaea', and *Jasminum parkeri*. In the foreground (left to right) are *Saxifraga kellereri*, *Draba bryoides* 'Imbricata' (in flower), *Selaginella remotifolia* 'Compacta', and *Saxifraga aizoon* 'Baldensis'. Not visible are plants of *Acorus gramineus* (1 inch high), *Vaccinium vitis-idaea* 'Minus', and *Helichrysum selago*. (Courtesy of the American Rock Garden Society Bulletin, October, 1966.)



Don Normark

Pitcher plants grown by George Schenk. *Sarracenia flava*, in company with the lower *S. purpurea*, grows here in sphagnum moss topped with rock chips. Plants are watered daily in dry weather and always moved indoors during hard freezes.



Dwarf conifers make a miniature forest of varying color, texture and form in the garden of Joel W. Spingarn, who has contributed the article on propagating dwarf conifers on page 54. The large evergreen (center) and surrounding standard-size trees emphasize the dwarfness of the conifers in his collection (foreground).

DWARF EVERGREENS AND OTHER SMALL SHRUBS

THERE ARE MANY DWARF evergreens suitable for miniature gardens, although after several years, a few kinds will have to be moved into the rock garden. The following is a short list of the more suitable slow-growing evergreens and shrubs:

Abies balsamea 'Hudsonia'—Plant becomes more attractive with age and as trunk forms.

Cedrus brevifolia—Foliage a deep blue-green; branches sometimes horizontal but often arched and pendulous.

Cedrus libani 'Comte de Dijon'—A very handsome dwarf.

Chamaecyparis lawsoniana 'Forsteckensis'—A blue-green ball, branches twisted and clustered.

Chamaecyparis lawsoniana 'Elwoodii Nana'—Dwarf, dense upright column of feathery blue plumes. Needs winter protection from wind and sun.

Chamaecyparis lawsoniana 'Minima'—Very slow-growing globe form.

Chamaecyparis pisifera 'Filifera Aurea Nana'—Long, thread-like branchlets of pale green. Young plants are sparse but become very dense and attractive with age.

Cryptomeria japonica 'Nana'—Very stiff, tiny needles on stout branches. Very slow growing.

Juniperus communis 'Compressa'—A very tiny Irish juniper. It has light gray-green foliage in a slender columnar form.

Picea abies 'Echiniformis'—One of the smallest forms of Norway spruce. A ball of short stiff branchlets with short, dark green needles.

Picea glauca 'Conica'—The very popular Alberta spruce does eventually become too big for a miniature garden and must be moved to larger space. (Note:

A specimen I planted in a cement container in 1953 still flourishes there. A patch of an encrusted saxifrage, the only other occupant of the container, flowers each year.—A. S.)

A few dwarf shrubs other than coniferous evergreens:

Andromeda polifolia 'Nana'—Leaves silvery gray; urn-shaped flowers white, flushed with pink. For acid soil that retains moisture.

Berberis buxifolia 'Nana'—Compact barberry with reddish green leaves and orange flowers.

Calluna vulgaris 'Foxii Nana'—Compact, rounded heather from 2 to 3 inches high. Needs acid, peat soil. There are other heaths (*Erica*) and heathers (*Calluna*) suitable for a miniature garden, especially when plants are young.

Jasminum parkeri—Small shrub with yellow flowers. Height about 12 inches. Not reliably winter-hardy north.

Leiophyllum buxifolium (Sand-myrtle)—Delightful shrub with dense clusters of small white flowers in spring. For sandy, acid soil.

Rhododendron impeditum—Lavender-blue flowers. Slow-growing, small-leaved species.

Rhododendron keleticum—Purple-crimson flowers. Height about 6 inches. There are several other small rhododendron species and varieties, including the variety 'Puck'. Certain azaleas like the Gumpo types are also suitable, especially when the plants are small.

Salix boydii—A small upright willow. May be grown in containers for many years by pruning to restrict growth.

Salix purpurea 'Nana'—A low, very hardy shrub of the Arctic with gray-blue leaves. After a few years it may require restrictive pruning. ♦

THE PROPAGATION OF DWARF CONIFERS

In a greenhouse bench, coldframe or miniature greenhouse

Joel W. Spingarn

DWARF CONIFERS rarely produce viable seed, and when they do the resulting progeny are usually arborescent trees. However, some exceedingly interesting plants have been produced from seed of the dwarf form of Hinoki cypress, *Chamaecyparis obtusa* 'Gracilis Nana'. Dwarf forms of the Lawson cypress, *Chamaecyparis lawsoniana*, and various junipers have been known to set seed, and experiments are being conducted with seed found in cones of witches' brooms (an abnormal dwarf growth on an otherwise normal tree) in the hope of discovering new and interesting dwarf plants.¹

It would be unusual, however, for the average dwarf-conifer enthusiast to find such seed on his plants, so most of us must be content to propagate our plants vegetatively, from cuttings or by layering.

It is with some hesitation that I set forth rules-of-thumb for the propagation of dwarf conifers from cuttings, for I believe that many of the "rules" can sometimes be changed or left unheeded. A "rule" that might insure successful rooting at one time may not prevent failure the next. Indeed, deliberate violation of the rules sometimes leads to the discovery of a way to root some heretofore difficult form.

I recall an instance when two dwarf forms of *Picea pungens* and a pendulous form of *Picea abies* rooted exceptionally well in a coldframe containing a rooting medium consisting of three-fourths peat and one-fourth sand—a very "wet" mix-

ture indeed, and one hardly to be recommended for most other conifers. At another time, a defective heating-cable thermostat kept the rooting medium at a temperature above 80 degrees. I found this beneficial in rooting a form of *Cedrus brevifolia* that I had never previously rooted.

The moral, of course, is not to expect the information that follows to offer panaceas for all propagating problems, nor a sure-fire method of perpetuating your plants. But knowledge of the rules, together with a bit of understanding of the growth habits of individual plants, should cause some success to be forthcoming.

Most of us are familiar with the cycle of growth of our plants: As spring approaches the warmth stimulates the buds, which swell and produce new shoots. The new foliage eventually hardens off as fall arrives. You may have noticed that different plants terminate their top growth at different times from late summer onwards, as evidenced by the deepening color of the foliage and the formation of next year's buds. However, few of us are familiar with the stages of growth which take place underground. As soon as the soil warms in spring, a minimal amount of root growth occurs, but most such growth takes place as the cool air of fall terminates the top growth, thereby causing growth to concentrate under the still-warm soil. Keeping this in mind will aid in timing the insertion of your cuttings. Taking cuttings first from those plants that have finished their top growth is generally the rule.

¹See Brooklyn Botanic Garden's PLANTS & GARDENS, Winter 1960-61 (Vol. 16, No. 4): "Dwarf Conifers Derived from Witches'-Brooms," by Alfred J. Fordham (condensed from ARNOLDIA, the Arnold Arboretum, Harvard University, June 23, 1967).



A miniature greenhouse. Cuttings root easily in a flat covered with polyethylene plastic. Flaps cut in sides are opened daily to supply air to prevent diseases.

The cutting material should be firm but not rubbery or brittle. For most dwarf conifers, I find 2-year-old wood roots most satisfactorily. Extremely diminutive conifers that grow only $\frac{1}{4}$ to $\frac{1}{2}$ inch in a season provide such small cuttings that it is necessary to cut 3-year-old wood.

The major difficulty of propagation is keeping the cutting material in good condition while waiting for the roots to develop. If this can be done, I believe that almost any cuttings will eventually produce roots. It takes some conifers as short a time as two weeks to grow roots, whereas others require a year or more. The more time required, the more difficult the plant will be to propagate.

One of the simplest methods is to use a

wood or plastic flat, the size depending on the number of cuttings to be inserted. Be sure the bottom is not completely sealed. If it is, drill holes to facilitate drainage. Line the bottom of the flat with plastic or aluminum screening to prevent the rooting medium from escaping. Bend heavy wire (wire coat hangers will do) into semicircles to form ribs, and insert the ends in the flat to form the framework of a quonset-hut shape. Three ribs are usually sufficient for an average-size flat.

Fill the flat with rooting medium consisting of 60 percent clean sharp sand (do not use kiddies' playground sand) and 40 percent shredded peat moss (do not use the kind called Michigan peat). If you wish to hasten rooting, an inexpen-



Greenhouse mist propagation. An ideal arrangement, with the propagating bench in the sunlight on the south side of the greenhouse. A heating cable maintains 70-degree temperature under the rooting medium. Mist burst is set for one second every 5 minutes to maintain turgidity of cuttings. Potted cuttings are near the glass.

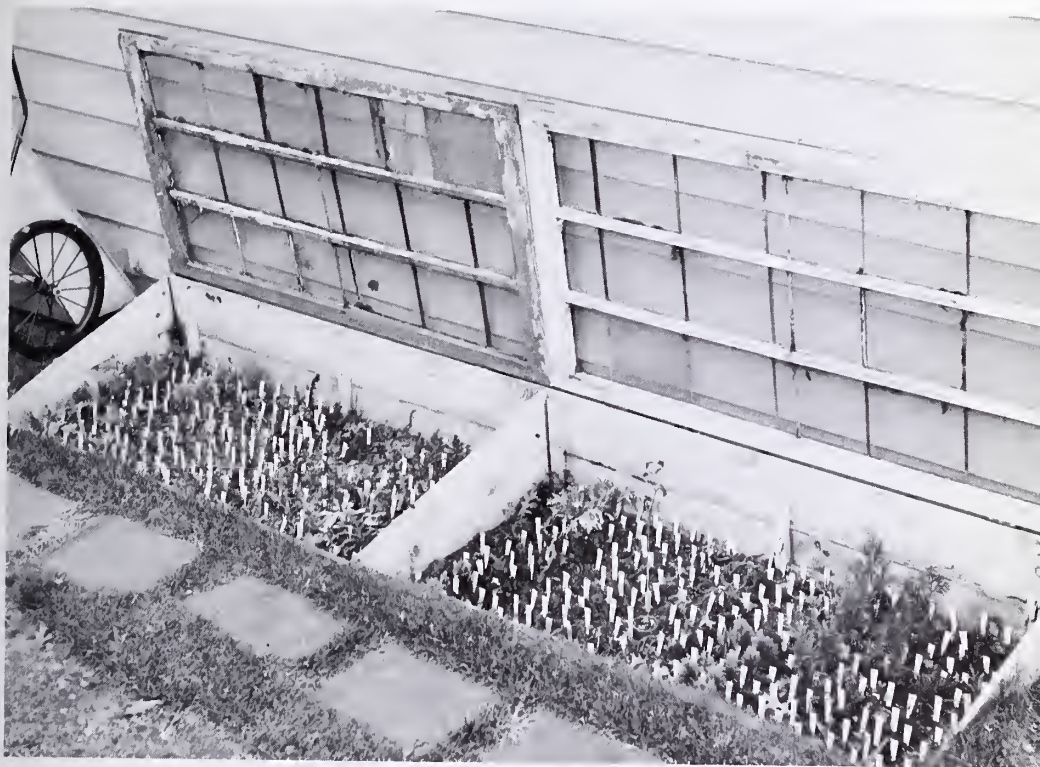
sive soil-warming cable that automatically maintains the soil temperature at 70 degrees can be spread out in the bottom of the flat before the rooting medium is added. The cable can be purchased in 5-foot lengths with a built-in thermostat from larger garden-supply or nursery-supply firms. Five feet is about the right length for a flat.

Take cuttings from mid-August to mid-September, depending on the growth of individual plants. Or take winter cuttings in the first part of January. Remove about $\frac{1}{2}$ inch of foliage from the base of an average-size cutting, less from the very diminutive forms, and 1 to 2 inches from the larger cuttings.

To stimulate root growth, dip base of

each cutting in a hormone rooting powder to which has been added a small amount of a fungicide such as Captan.

Insert cuttings in rows in the flat, so the foliage just touches that of the next cutting. Be sure to label each group to prevent mixups later. Firm the rooting medium well around the cuttings. Water thoroughly with a fine spray and allow to drain. Spread polyethylene sheeting over the wire ribs and staple or tack the plastic to the sides of the flat, sealing in the cuttings and forming a miniature greenhouse. Cut a 3- or 4-inch flap on each side of the tent for ventilation. It is advisable to open the flaps for an hour or so each day to prevent fungous diseases. In ventilating, your good judgment is



Coldframe propagation. The frame has been placed on the north side of a building, so no shading is needed. The deeper the level of the rooting medium, the less subject the cuttings will be to freezing and thawing in winter. The surface should be well below grade level. A number of cuttings can be accommodated in a frame.

essential. The medium should not be kept too wet, nor should it be allowed to dry out; at the same time, the cuttings should receive some direct change of air.

Place the propagating flat in bright light where it will not receive direct sunlight. A white cloth may be used to shade cuttings during periods of sunshine. For cuttings inserted in fall, the propagation case can be placed outdoors in a shady spot where the air temperature is 65 to 75 degrees. For winter cuttings, an unheated sun porch or the window of an unheated basement is good. Ideally, the air temperature is best kept lower (45 to 60 degrees) than the temperature of the rooting medium, which would be kept at a constant 70 degrees by the soil-warming

cable. Most of the cuttings taken in January will be rooted by spring. After a hardening-off period these will be ready to plant outdoors.

Fall cuttings should be rooted by the end of November. Pot up rooted cuttings; and after they have shown further root growth, they can be hardened off and placed in a shaded coldframe. If no frame is available, plunge pots in a protected area and cover with oak leaves, salt hay or some similar material that will permit air to circulate around the plants but will prevent the successive freezing and thawing that would heave plants out of their pots. When spring arrives, remove the covering a little at a time to harden young plants to full exposure to air and light.

(Continued)

Coldframe Propagation

Another method of propagating cuttings that is well known to most gardeners is the use of a coldframe situated on the north side of a structure where no shading would be required. This is a most practical and inexpensive way to handle a large number of cuttings. For best results, the coldframe should be dug deep enough so that the surface of the rooting medium is well below grade level. This will prevent the freezing and thawing that tends to heave out the cuttings. A 4-inch layer of rooting medium (60 percent sand and 40 percent peat moss) over a 4-inch layer of coarse gravel is adequate.

For coldframe propagation, it is best to take cuttings starting in mid-August and continuing through October as the plants appear to be ready. Taking cuttings during the winter is not practical for coldframe propagation.

Greenhouse Propagation

For those fortunate enough to have a greenhouse, the procedure is the same, except that a portion of a greenhouse bench is used instead of a covered flat or coldframe to contain the rooting medium. An area of 5 square feet will easily produce 500 to 1,000 plants from fall through spring, if one replaces the cuttings as rooting takes place and the earlier batches are potted up. Here again, the soil-warming cable is of immeasurable help. The greenhouse thermostat is set at 50 degrees, while the rooting medium is kept at 70 degrees by the soil cable. A wire framework can be built around the propagating area and covered with polyethylene in much the same way as described for the propagating flat.

However, a much improved method for keeping the cutting area humid (and the cuttings turgid) is to use a mist nozzle over the area, which in this case can be situated in a part of the greenhouse with some sunshine. A solenoid valve and time clock can be incorporated into the system so that any degree of misting desired can be obtained. It is necessary to have the

mist burst only for a second or two every 5 to 10 minutes. The purpose of the misting is to replace only the amount of water lost by evaporation and transpiration. Some experimentation will be required to determine the amount of mist required. The advantage of the mist system over the polyethylene-covering method is that the problems of damping-off and stem rot of cuttings are almost eliminated by the improved circulation of air.

Outdoor Mist Propagation

A good deal of the preceding information must be disregarded when propagating outdoors under mist. The propagating area should be in full sun. Flats of wood, plastic or nonrusting metal can be used, but drainage must be perfect. The rooting medium should be sharp builders' sand with no other material added. Mist nozzles—the number depending on the area to be covered—are erected about 2 feet above the flats. The mist nozzles can be obtained from various nursery-supply firms. Information as to the required mounting height and coverage is usually supplied by the manufacturer.

A garden hose can be adapted to supply the mist nozzles with water from the nearest faucet. The system is turned on manually during all daylight hours except during periods of rain. An improved method is to employ a solenoid valve and timer that automatically turns on the mist intermittently. This method has the advantage of using less water and is less apt to leach the chlorophyll out of the cuttings. In addition, the temperature of the rooting medium remains higher due to the reduced flow of water.

Larger cuttings can be used for outdoor mist propagation than for other methods. They are taken during the first two weeks of June while the plants are in full growth. Be careful to keep the cuttings moist until they are placed under the mist. The soft growth can easily be dehydrated if precautions are not taken. Dip the bases of the cuttings in the hormone powder before inserting them in the flat. If wind becomes a problem by preventing the mist from evenly wetting

the cuttings, a windbreak of polyethylene can be erected around the flats.

Cuttings of the conifers that root most easily may begin to root in two weeks, whereas the more difficult kinds may take as long as three months. The weather plays an important role—extended periods of bright sunny skies will hasten rooting. After cuttings have been rooted and potted, it is necessary to wean them away from the mist environment. This can be accomplished by plunging the pots in a half-sunny area and wetting down the young plants two or three times a day for the first few days. Decrease this operation gradually. If weather is hot and dry, water plants more often. Protect the plants over the first winter.

Propagating Techniques

Abies: Most forms can be rooted, using No. 3 hormone powder. Terminal shoots should be used for erect-growing forms. Take cuttings of side shoots for globose, procumbent and prostrate forms.

Cedrus: The true cedars are difficult, but *Cedrus deodora* and *C. brevifolia* respond to No. 3 hormone powder.

Chamaecyparis: False-cypress cuttings are among the less difficult. Use No. 3 hormone powder, or No. 2 on softer wood. The juvenile forms can generally be inserted at any time of the year with success.

Cryptomeria: The dwarf forms root easily. Use No. 3 powder.

Juniperus: Most junipers root readily, with the exception of those forms with primarily adult, or scale-like, foliage. These may prove more difficult. Use No. 2 hormone powder on the juvenile forms and No. 3 powder on the scale-like forms, and also on cuttings with woody stems.

Picea: The vast majority of spruce variants can be propagated from cuttings. Use hormone powder No. 2 or No. 3, depending on the hardness of the wood. Weeping forms of *Picea abies* and dwarf forms of *Picea pungens* respond well to No. 3 powder. The weeping form of blue spruce, *Picea pungens* 'Glaucua Pendula', is very difficult. This form is usually perpetuated by grafting. When preparing



Outdoor mist propagation. Plastic or glass keeps wind from diverting mist.

spruce cuttings for insertion, it is best to cut off the needles at the base with scissors instead of pulling them off, which injures the stem.

Pinus: Most pines require grafting, but *Pinus mugho* and possibly *P. strobus* can be rooted. Take soft growth during summer and propagate outdoors under mist. Hormone powder No. 3 is best.

Pseudotsuga: Few forms of the Douglas-fir have been rooted. Propagation is usually by grafting. I believe that further experimentation is in order.

Sequoia, Taxus, Thuya and Thujaopsis: All root easily with few failures. Use hormone powder No. 3.

Tsuga: Very few hemlocks present any difficulty. The dwarfs are generally easier to propagate than the arborescent forms. Take cuttings from late August and continue through January; or take them in the first part of June for outdoor-mist propagation. Problems that arise in propagating hemlock often can be traced to a lack of air circulation. For this reason allow plenty of space between cuttings. If using a polyethylene covering, be sure to raise the cover each day for a change of air. Use hormone powder No. 2 or 3, depending on hardness of wood. ♦

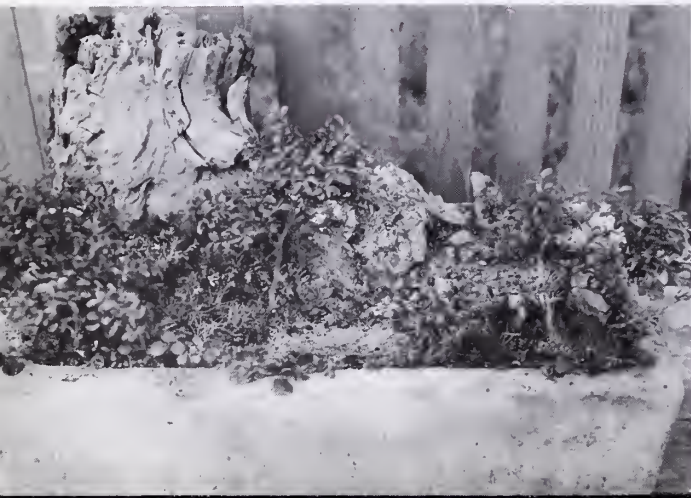


George Taloumis

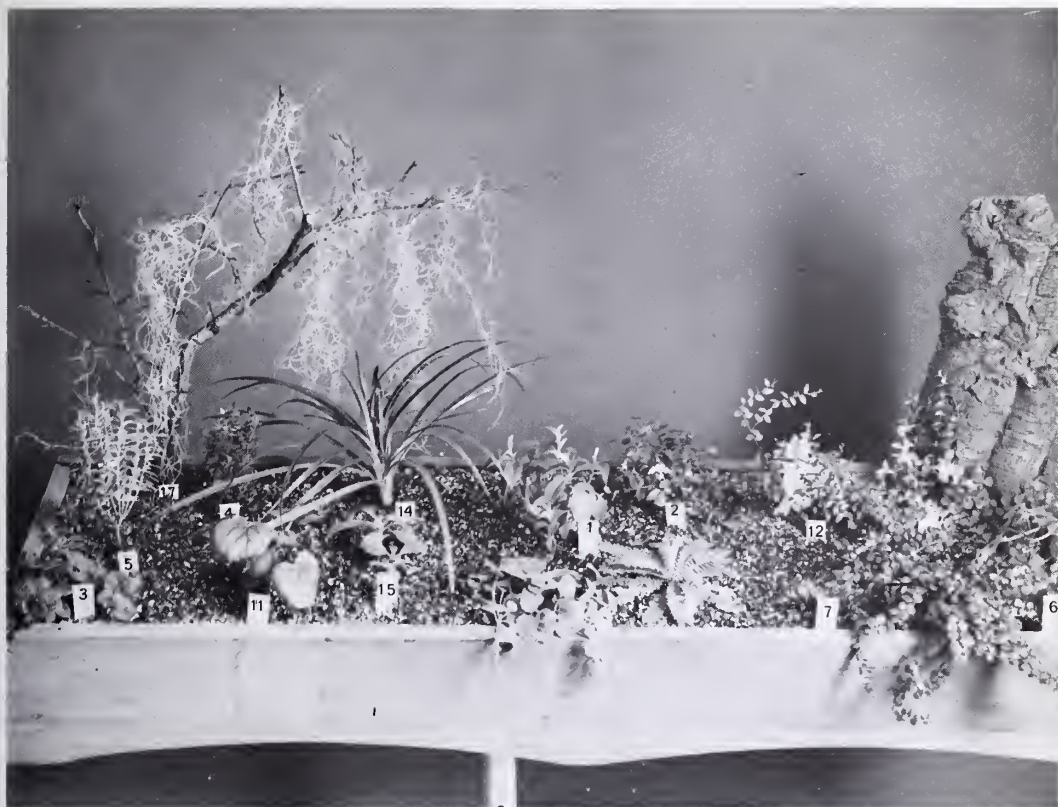
The immovable sink garden of Mrs. Ellery Sedgwick of Beverly, Mass. is 4 by 2 feet and includes dwarf conifers such as false-cypress, hemlock, fir and arborvitae.

MORE MINIATURE GARDEN IDEAS

Many kinds can be made for indoors or outside



Weathered wood dominates Mrs. Sedgwick's sink garden which includes 'Kingsville' box, Arenaria, twin-flower and houseleek. Its dimensions are 15 by 7 inches and it is 4 inches deep.



Jack Kramer

Brooklyn Botanic Garden



The tropical garden (above), suitable for a well-lighted but not sunny window, includes *Peperomia* (1), *Malpighia coccigera* (2), *Carissa grandiflora* 'Horizontalis' (3), *Myrtus communis* 'Minima' (4), variegated *Euonymus* (5), *Pyrrosia linearifolia* (6), and *Sinningia* 'Baby Doll' (16). Spanish-moss (*Tillandsia usneoides*) is draped over the branch. The growing mixture for such a garden may be 1 part sand, 1 part peat moss and 1 part soil. Or use any of the mixtures packaged and sold especially for African-violets.

At left: This glass-dome-enclosed garden contains only three plants and has the advantage of using very little space.

(Continued)



A miniature landscape idea for an outdoor terrace is this wooden planter (4½ by 2 feet, 6 inches deep) of dwarf evergreens and other small plants. *Left:* Some winter protection is necessary for exposed sites, especially on city terraces. A light mulch of excelsior and a sheet of plastic are recommended. (See also page 63.)



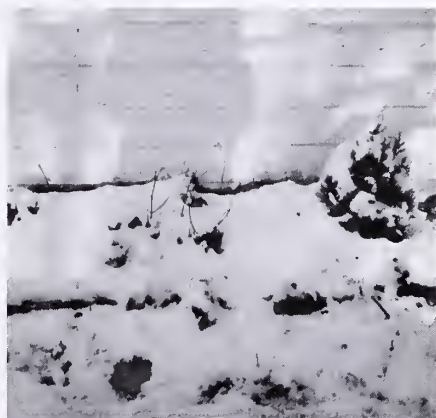
A window box of heathers (*Calluna*) for an outdoor terrace in full sun. The soil should contain a high proportion of peat moss (1 part sand, 1 part soil, 2 parts of peat moss) and care must be taken not to overwater the plants. Winter protection will be necessary to prevent burning of the evergreen foliage (see facing page). Use the following varieties or any young plant: 'Foxii Nana', 'Tib', 'Minima', 'Crispa', 'Juno' and 'Elsie Frye'. Heathers can be shaped and kept compact by spring pruning.

In cold climates, miniature gardens need

WINTER PROTECTION

IN AREAS where winter temperatures stay below freezing for any period or where temperature fluctuations cause alternate freezing and thawing of the soil, it is advisable to protect the plants in miniature gardens. Actually, the idea is to keep the gardens, especially when they are planted with very hardy alpine and other rock garden plants that normally experience severe winters, evenly cold. As would be expected, a snow cover is ideal for this purpose but as a constant

blanket of snow is rare in many areas, a loose packing of marsh hay or oak leaves is a more reliable covering. The hay or leaves will also prevent winter burn of evergreens if they are packed carefully around the plants. Miniature gardens, if not too heavy to transport, will fare better over winter out of direct sun and sheltered from drying winds. Most gardens of hardy plants can be expected to survive winters where night temperatures remain below zero for two weeks or so.



These containers displayed on cement blocks (above, left) are moved near the house's foundation (above, right) for better protection in the winter months.

Left: Miniature gardens can also be wintered in deep coldframes or protected by a covering of marsh hay and in areas where mice or rabbits are prevalent, covering the gardens with hardware cloth or a small-mesh chicken wire is recommended.

NURSERIES, SEED SOURCES, BOOKS

Plants and Supplies

Alpenglow Gardens, 13328 Trans-Canada Highway, North Surrey, British Columbia, Canada. Rare plants. Catalog 25 cents.

Armstrong Associates, Inc., Box 127, Basking Ridge, N.J. 07920. Miniature greenhouses, terrariums, insectivorous plants.

Arthur Eames Allgrove, North Wilington, Mass. 01887. Terrariums, bottle gardens, plants, books. Catalog 25 cents.

Barrington Greenhouses, 860 Clements Bridge Road, Barrington, N.J. 08016. Miniature house plants.

Albert H. Buell, Eastford, Conn. 06242. Miniature gesneriads. Catalog \$1.00.

Cape Cod Nurseries, (H. V. Lawrence, Inc.), Falmouth, Mass. 02541. Heaths, heathers.

Carolina Biological Supply Co., Burlington, N.C. 27215. Carnivorous plants, supplies for educational purposes.

Conard-Pyle, West Grove, Pa. 19390. Miniature roses.

Goodwill Garden, Route 1, Scarborough, Maine 04074. Alpines. List 6¢ stamp.

Ben Haines, 1902 Lane, Topeka, Kansas, 66664. Hardy, tender cacti and succulents. List \$1.00.

Alexander Irving Heimlich, 71 Burlington St., Woburn, Mass. 01801. Small bulbs.

Johnson's Cactus Gardens, Paramount, Calif. 90723. Cacti. Catalog 10 cents.

Kathelen Gardens, Durham, N.H. 03824. Rock garden plants.

Rudolph Kluis Nurseries, R.D. 1, Box 116, Ryan Road, Marlboro, N.J. 17746. Dwarf conifers, rhododendrons.

MacPherson Gardens, 2920 Starr Ave., Oregon, Ohio 43616. Sempervivums.

Mayfair Nurseries, R.D. No. 2, Nichols, New York 13812. Dwarf conifers and shrubs, heaths and heathers.

Merry Gardens, Camden, Maine 04843. House plants for miniature gardens.

Oliver Nurseries, 1159 Bronson Rd., Fairfield, Conn. 06430. Evergreens for rock gardens.

Rainier Mt. Alpine Gardens, 2007 So. 126th, Seattle, Wash. 98168. Dwarf conifers and rhododendrons, alpines.

Siskiyou Rare Plant Nursery, 522 Franquette St., Medford, Oregon 97501. Alpines, rock plants. Catalog 50 cents.

Sky-Cleft Gardens, Camp St. Ext., Barre, Vermont 05641. Rock plants.

Sky Hook Farm, Johnson, Vermont 05656. Primulas.

A Miniature City with Miniature Plants

OF INTEREST to miniature plant and garden enthusiasts who may be traveling in Holland between April 1 and October 31 is the miniature city of Madurodam located near The Hague. The "city," which actually extends over 5 acres, is landscaped with a great number of true miniature plants as well as young specimens of standard-size plants. Rock garden plants, dwarf forms of conifers and miniature bulbs are used as well as miniature roses, young heathers and seedlings of deciduous trees. The visitor will see hedges, no higher than 4 inches, of lavender, *teucrium* and *santolina*. The "city" is modeled after the usual metropolis and its surrounding areas and includes a business district, airport, harbor, highways, forests and suburban sections, all landscaped with appropriate plant material in proper scale.

Sequoia Nursery, 2519 East Mineral King, Visalia, Calif. 93277. Miniature roses.

Joel W. Spingarn, 1535 Forest Ave., Baldwin, N.Y. 11510. Dwarf conifers.

Thurman's Gardens, Route 2, Box 259, Spokane, Wash. 99207. Alpines, dwarf conifers, seeds.

Wild Garden, The, 8243 NE 119th, Kirkland, Wash. 98033. Bog and rock plants, ferns. Wide range of plants for various landscaping purposes. Catalog 25 cents.

Seeds from Plant Societies

Some unusual rock plants are more readily available in seed form than as plants. The following two plant societies offer members an annual seed list: Alpine Garden Society, c/o E. M. Upyard, 58, Denison House, 296, Vauxhall Bridge Road, London, S.W. 1, England. (\$5.60 a year); American Rock Garden Society, c/o Richard N. Redfield, Box 26, Closter, N.J. 07624. (\$5.00 a year).

Books on Miniature Gardening

All About Miniature Plants and Gardens, Bernice Brilmayer, Doubleday, Garden City, N.Y. 1963. (\$4.95)

Bottle Gardens and Fern Cases, Anne Ashberry. Hodder and Stoughton, London. 1964. (\$5.95)

Gardens in Miniature, Anne Ashberry, Brockhampton Press, Leicester, England. 1967. (\$4.95)

Indoor Gardens, Ware Budlong. Hawthorn Books, New York. 1967. (\$6.95)

Miniature Flower Arrangements and Plantings, Lois Wilson. D. Van Nostrand Co., 1963. (\$6.50)

Miniature Plants for Home and Greenhouse, Elvin McDonald. D. Van Nostrand Co., Princeton, N.J. 1962. (\$5.95)

The Miniature Rose Book, Margaret E. Pinney. D. Van Nostrand Co., 1964. (\$6.25)

Miniature Trees, Plants and Landscapes, Tatsuo Ishimoto. Crown Publishers, New York. 1956. (\$2.95)



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For a list of topics see back cover.



Eugene Cook for CBS

New York City's newest park, Paley Park, established in 1968 by William S. Paley in memory of his father, Samuel Paley. At the rear is a 20-foot-high waterfall.

BROOKLYN BOTANIC GARDEN

About This Issue of *Plants & Gardens*:

As readers have come to know, we devote the final issue of each year to the presentation in condensed form of articles of lasting interest and/or significance that have appeared in other publications during the year. Not all are about gardens nor are they all horticulturally slanted. It is part of the Botanic Garden's job to screen the year's production and to come to you with articles that we feel should not be missed. This is the 24th year that our Editorial Committee has made its annual selection, and we again want to thank the authors, editors and publishers of the original articles for their friendly cooperation.

The Year-end, 1968-69

About Paley Park—a vest-pocket park.

The photograph on the opposite page is of a unique parklet in New York City. It is on the north side of busy East 53rd Street between Fifth and Madison Avenues and was made available to the people of New York in 1967 by Mr. William S. Paley, in honor of his father Samuel Paley. It is privately owned and operated by the Greenpark Foundation (a Paley philanthropy) without cost to its visitors or to the City of New York. It has won a dozen or more awards.

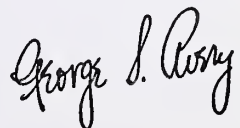
The small size of the park (42' x 100') is no measure of its quality, its charm, or its contribution to the life of the City. It represents the donor's concept that small areas in thickly settled urban communities can be used effectively for park purposes.

The gates are open daily from 8 A.M. until 10 P.M., with earlier closings during the winter months. One or more attendants are on duty at all times and the park is lighted after dark. The place is practically self-policing.

Shaded by seventeen honey locust trees placed at 12-foot intervals, the parklet has a natural green canopy over the entire site from spring well into late autumn. At the rear is a 20-foot-high waterfall with re-circulating water, designed to provide a background of sight and sound that nullifies street noises. The park is equipped with seating walls and individual chairs and tables instead of the traditional benches.

The waterfall runs every month of the year, and is heated during the winter months to keep from freezing. It is cut off at midnight except during freezing weather.

Light refreshments are served through a concessionaire and people may sit at the tables or on the low walls to enjoy their snacks. The "floor" of the park is somewhat above street level so visitors feel that they are "away from it all." The quality of garden attendants is important and Greenpark Foundation representatives feel that they have chosen well. The same attendants, who started with the park when it opened in May 1967, are on duty today.



Director

"The Indian approached and used Nature with reverence"

PLANT HERITAGE FROM THE AMERICAN INDIAN

Elizabeth Remsen Van Brunt

Condensed from BULLETIN of The Garden Club of America, September 1968.

THE INTEREST in native plants today dates back for untold centuries, when man was dependent upon natural phenomena for food, for cures, for his very life. Science has now and again verified these sometimes scorned uses. Researchers at the University of Wisconsin recently discovered that the traditional use of the woody nightshade (*Solanum dulcamara*) for warts and cutaneous growths blocked certain growths in rats. Coltsfoot in a brew to alleviate pulmonary complaints was used not only in America; the golden blossom has long been the trade sign hung before the apothecary shop in France. Have you ever tasted that intriguing flavor? It may be had in slim grey-brown sticks, ideal for licks when your child has a persistent cough.

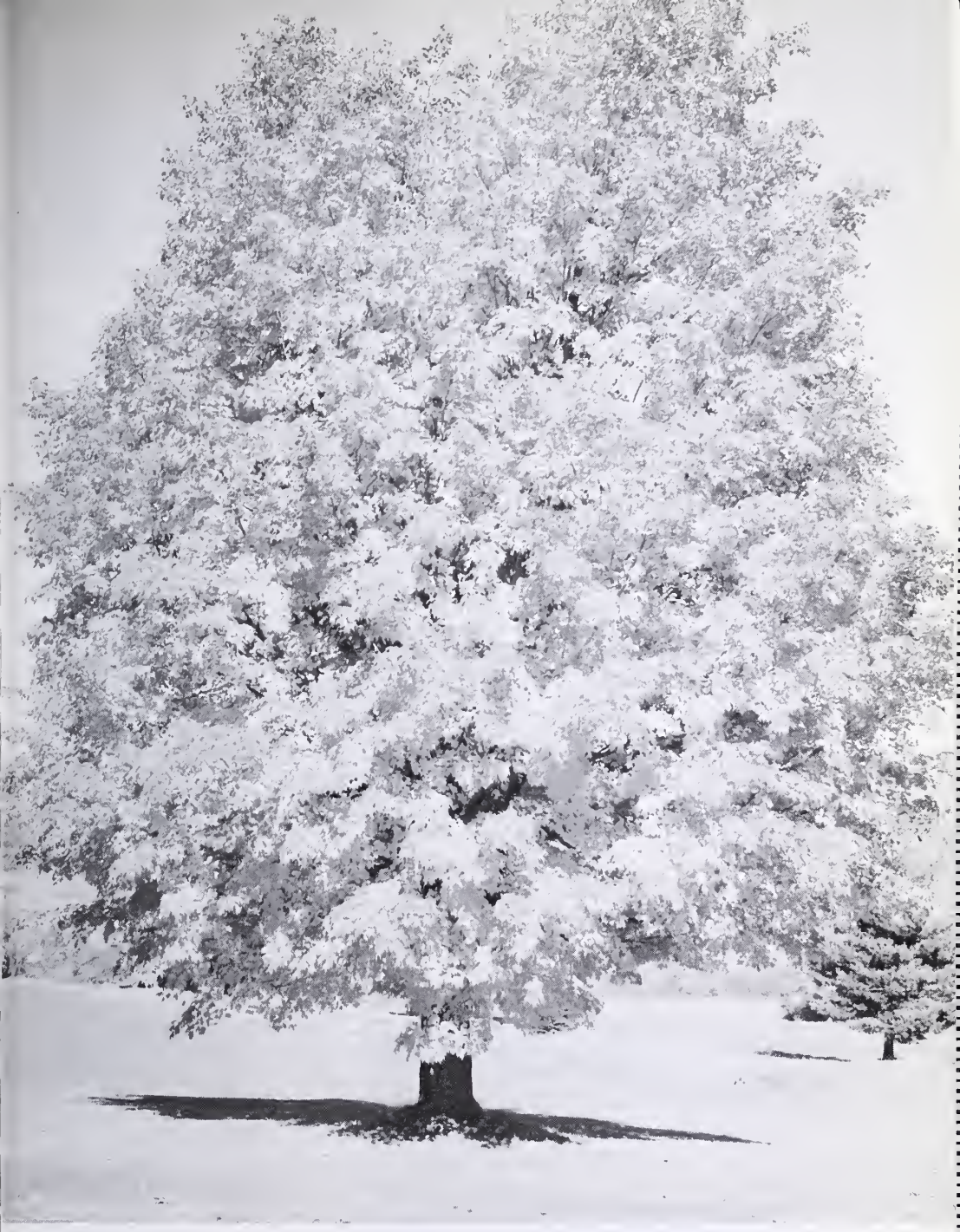
The American Indian used no salt as we know it, but cooked greens and roots with wild garlic or onion for flavor, or with the root stock of fern which gave a slightly salty taste. He sometimes boiled food in the "water of the sugar tree" (sugar maple) and if he lived near the sea he harvested oysters, clams and seafood for the salty flavor. Maggie (our cook who was proud of her descent from the Canarsie Indians) told us tales of oysters a foot long from New York Bay—and Maggie's veracity was unquestioned after we read that the Labadist Brothers, traveling to New Amsterdam in the 17th century, left a diary recording a visit to our ancestor Jacques Cortelyou, Surveyor-General under Peter Stuyvesant and the uncontested holder of title of first commuter (by sloop) from Brooklyn to New York. They slept in his barn and

were feasted upon the "foot-long" oysters.

The Indian dug roots of wild ginger for seasoning. He dried roots of many plants for winter use: arrow-head, cat-tails, earth-nut (*Apios tuberosa*), Jack-in-the-pulpit. The latter was grated and made up into cakes, as flour. Corn was dried, also wild fruits: cherries, apples and plums, blackberries and strawberries, which steeped in maple syrup are delicious.

A descendant of the American Indian has explained that they lived a relaxed life before the white man threatened it. There was no inducement to stay awake beyond sunset, such as we have with electricity, radio and television, the movies and the telephone. The Indian had no nervous headaches, no high blood pressure, no ulcers, and some say no arthritis. Most of his ills were from tooth decay (lack of Vitamin C?). He had plentiful meat, if a good hunter, and he worked hard to procure it, which in itself was a way to health. He used ample wild greens in the spring, and had discovered the value of many plants, bark and root as well as leaves, for medicinal use.

The Indian approached and used Nature with reverence, and we may well take a lesson from his attitude. If he stripped bark from a tree for weaving into baskets or cloth, if he gathered poke-weed shoots in early spring, or tightly curled fern fronds (those fiddleheads so delicious boiled and served with butter and seasoning), if he cut a dogwood branch for fashioning into tool or dagger, he begged: "Forgive me, brother, for I have need of this." He believed plant and tree were inhabited by the spirit of



A. Devanney, Inc.

American Indians are known to have boiled vegetables in the sap of the sugar maple (*Acer saccharum*). The red men's conquerors are jeopardizing the health of many of these magnificent trees that grow along highways—the trees are being injured by accumulations of salt put on the roads in winter to melt snow and ice.

an Indian, that each had been put upon the earth for man's need, to be used with care and thanks.

If the root of sassafras was dug, the Indian replaced it with the seeds of tobacco or corn (try a bit of sassafras root in your next pot of apple sauce—delicious!). French explorers were taught by the Indians to drink sassafras tea as a cure for scurvy, that scourge of sailors on long voyages. Ginseng root was considered a cure-all—the Chinese could not get enough of their own variety and much was exported from here, depleting our supply until there is little to be found today. The Chinese believed it increased virility and prolonged life.

Indian women, digging at the margins of ponds for arrow-head roots (mealy as a potato when roasted) and the banana-shaped tubers of the chinquapin which, peeled and sliced was a toothsome addition to the stew, often found the muskrats' cache of such roots in his underwater tunnel. They took some, but were careful to leave a few for the muskrats.

The black birch was called "the light of the world"; its oil-rich branches flamed as torches. Its twigs were brewed into beer or chewed until a tip made a toothbrush. The oil has been used as a lubricant for metal tools and wheels. Cat-tail leaves

were thatching for the tops of wigwams—they shed the rain; stalks were sharpened for darts and knives, the down made comfortable—and absorbent—lining for the papoose cradle of deerhide, which was also lined sometimes with the absorbent and antiseptic sphagnum moss used in our day as packing for wounds as well as packaging for plants.

Dyes were made from many plants: bloodroot (orange), nettles (green), wood betony (yellow), walnut (brown), pokeberry (magenta), puccoon (red) and a long list of roots, barks or berries. Bloodroot was used not only as a dye, for war paint primarily, but as a love charm: a young brave, dipping his finger tips in the juice, left his imprint on a girl's cheek, marking her as his property.

Our Maggie dripped bloodroot juice on cubes of sugar, turning them orange-red to our horrified gaze, presenting them firmly for winter coughs. We sucked them warily, for their odd flavor scared us, but they did soothe a scratchy throat. On our walks we noticed that when she gathered a herb, or broke off a twig of black birch she seemed to hesitate, to whisper to herself, before handing it to us. Surely she was asking, as did her Canarsie forebears, "Forgive me, brother, for I must use this." ♦

NEW STAMP SERIES



EARLY in January 1969, the United States Post Office Department issued a series of four national beautification stamps. The stamps, which are colorful and attractive, are intended to encourage continued interest in beautification on the national as well as local scene. Beautification of parks, cities, streets and highways are the four areas emphasized.

Why some cuttings root more readily than others

HOW TO IMPROVE ROOTING IN DIFFICULT-TO-ROOT RHODODENDRON CUTTINGS

Choong Il Lee

Reprinted from NEWSLETTER of the Rhode Island Nurseyemen's Association, June 1968.

SEVERAL KINDS of synthetic growth regulators are used in nurseries and by home gardeners to stimulate rooting of cuttings. Nurserymen realize that even though cuttings are treated with root-promoting substances, rhododendron 'Dr. H. C. Dresselhuys' is very difficult to root, whereas cuttings of rhododendron 'Cunningham's White' root very easily. It has also been observed that the rooting ability of cuttings varies from season to season.

It is generally believed that in other plant genera some internal factors produced in leaves or buds (endogenous root-promoting substances) other than auxin are necessary for root formation on cuttings; and the factors are absent or insufficient in the cuttings that are difficult to root. If the basic reasons for clonal and seasonal differences in rooting capacity of rhododendron cuttings could be learned, propagation production could be more easily achieved.

The objectives of the experiments reported here were to identify the endogenous root-promoting substances in three clones of rhododendron and to study seasonal changes in levels of these substances. If a clone of rhododendron known to be difficult to root showed a lack of the substances, perhaps these could be added to bring about easier rooting.

Technique Employed

Stem tissues of 'Cunningham's White', 'English Roseum' and 'Dr. H. C. Dresselhuys' were collected at seasonal intervals,

dried and extracted with methanol. The extracts were separated by paper chromatographic technique and the effect of separated extracts on root initiation of mung bean cuttings, which were used as test plants, was studied.

In every season extracts from 'Cunningham's White' initiated the greatest number of roots in mung bean cuttings whereas the fewest roots were developed when the extract from 'Dr. H. C. Dresselhuys' was used. Extracts from 'English Roseum' showed intermediate effect. Results thus indicate that 'Cunningham's White' contains the greatest amount of endogenous root-promoting substance, and the smallest amount is present in 'Dr. H. C. Dresselhuys'.

Seasonal Variations

The levels of the substances being investigated generally showed considerable increase in September and decreased again in November to the level of July extracts. Conversely, a rooting inhibitor found in July extracts disappeared in September and reappeared in November extracts. These results may indicate why better rooting response can be obtained in late summer or fall than in any other season.

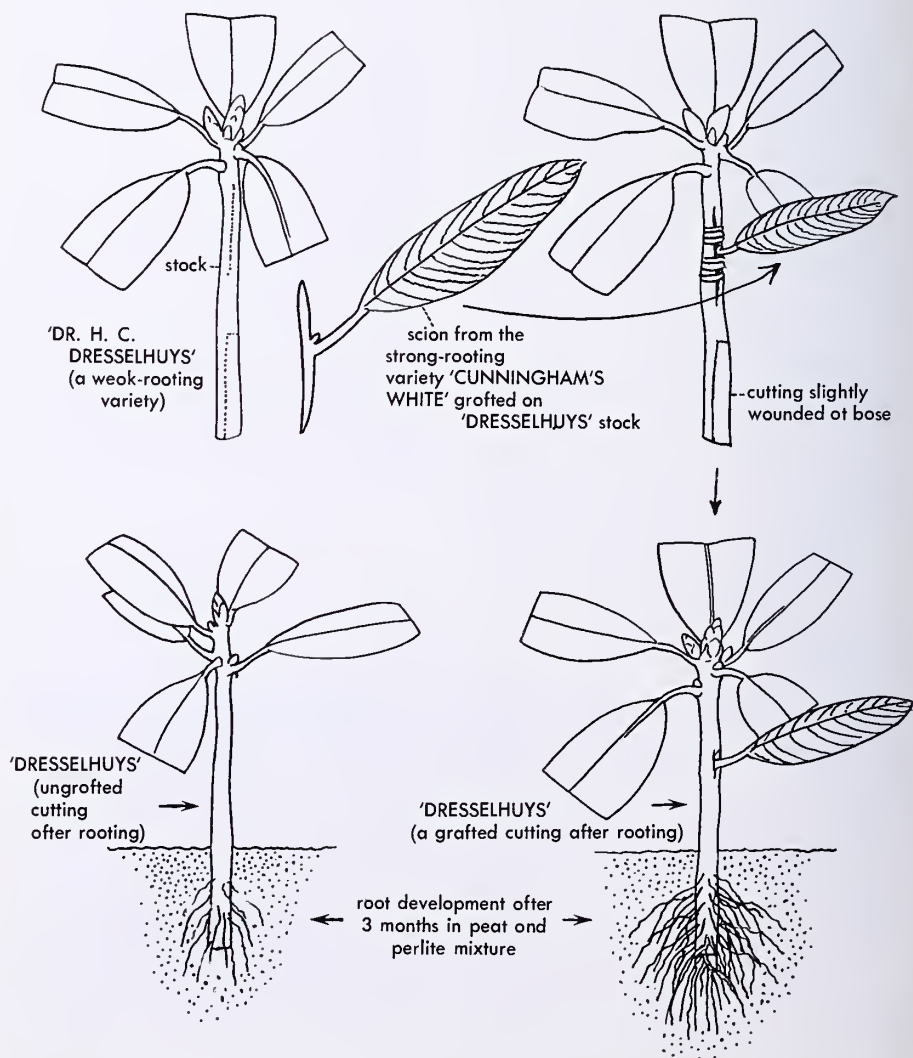
Effects of Grafts

The presence of endogenous root-promoting substance and the clonal variation in the amount of the substance was also shown by a grafting experiment. Leaf and bud scions of 'Cunningham's

White' were grafted to 'Dr. H. C. Dresselhuys' cuttings. It was found that a leaf and bud scion of 'Cunningham's White' significantly improved both rooting percentage and root-ball diameter of 'Dr. H. C. Dresselhuys' cuttings. On the other hand, 'Cunningham's White' showed considerably poorer rooting when a leaf and bud scion of 'Dr. H. C. Dresselhuys' was grafted to the cutting. Rooting capacity of 'English Roseum' was less affected by a leaf and bud scion of other clones of rhododendrons.

Summary of Findings

In summary, rooting ability of rhododendron cuttings from three clones was found to be related to the level of endogenous root-promoting substances other than auxin [an organic acid or group of acids which regulates normal cellular growth functions in plants] contained in cuttings. Seasonal variations in rooting response of cuttings may be due to seasonal changes in the level of these substances, which were found at their highest level in September. ♦



*Eleven years of collecting and displaying
spring wildflowers in Marin County, California*

THREE WOMEN AND A SHOW

Anne Leary, Barbara Menzies and Roberta Shockey

Condensed from CALIFORNIA HORTICULTURAL JOURNAL, January 1968.

THE Stinson Beach Wildflower Show was started eleven years ago as an innocent and joyful adventure when we were young mothers and housewives with a tremendous interest and enthusiasm for wildflowers. After seeing several shows we realized the need for a different type of exhibit. We were distressed by seeing the poor flowers stuffed in milk bottles, beer cans and dixie cups! We felt that if a flower is picked it should be displayed in the best possible manner. So we told the Stinson Beach Allied Arts that we would put on a wildflower show for them in the Community Center. Then we each drove several hundred miles gathering flowers. We collected our own vases and borrowed special things from friends. Carefully, we arranged each flower and did our best to label them. Then we opened the doors for our first show. The club was enthusiastic and members called friends from other towns to come and see it. They asked us to hold it over another day. Maybe a hundred and fifty people saw the first show, but it encouraged us to do it again on a bigger scale, and to charge admission the following year.

The community has always done everything possible to support and help us, including babysitting. The local children became interested when we began having a "Flower of the Week" at the local grammar school. As the years have gone by, the high schools and colleges in the area have become aware of the show and have planned their classes to take advantage of it.

Our eleven years of collecting have been one long backroad travelogue of spring streams forded, snow banks slushed through and mud slides negotiated. Many of our trips have been mem-

orable for "flower experiences." The 75-mile trip from Garberville to Covelo, Mendocino County, was one. We saw hillsides covered with *Erythronium californicum* and huge areas colored pink with calypso (*Calypso bulbosa*). Further on we saw the largest mission bells (*Fritillaria lanceolata*) we had ever seen. They were almost 3 feet tall. Scarlet fritillaries (*Fritillaria recurva*) grew in great abundance in areas on this road—even in the Mountain Lake dump, blooming among the tin cans.

One of our most thrilling trips was made last year in the Leesville area. The pink adobe lily (*Fritillaria pluriflora*) was making a sea of pink as far as one could see—for acres and acres. The plants were very large, some with as many as seventeen bells, and some were pure white. It was particularly exciting since we had spent years looking for them, as they are comparatively rare.

We have found that practically every flower grows within walking distance of the roads we travel. We have learned a great deal over the years as to what to pick and how to treat it so that it will hold up. If possible, we always pick in bud.

The purpose of our show is to give pleasure, and it is of scientific value. The legal aspects of picking do not worry us too much. We pick on private land wherever possible, and have been given permission to do so in many parts of the state. We are careful never to destroy someone else's enjoyment. We pick perennials more freely than annuals for obvious reasons. We are deeply concerned with conservation and try to live by it.

Reading of an appealing flower in one of the books on California wildflowers



Ken Molino

Anne Leary collects mission bells (*Fritillaria*). Several kinds are native to California.

oftens means a quest to find it. Our first challenge was to find the white fritillary of Marin County (*Fritillaria lilacea*). It took us two years. Now we realize it is not uncommon here. The most elusive mission bell was *Fritillaria pluriflora*, but what a reward!

When we read of a red buttercup (*Ranunculus andersonii*), we knew it must be found. A friend in Reno gave us directions to find it. The books agree that the flower is red to pink and that it blooms as the snow melts. We found it blooming on the road to Virginia City, Nevada, but red it was not, nor even pink. The sepals are a sort of brick red and the flower is white. So much for the botanists' color sense! (We enjoy a little side hobby with the black and white illustrations of our books. We paint or color the illustrations as we get to know the flowers.)

John Thomas Howell, of the California Academy of Sciences in San Francisco, comes each year to help us identify our collections. He is our salvation and our inspiration—and he can spell! He has done more to help us and to teach us than anybody else.

The people who come to our show are both a joy and a despair. There are those who are always enthusiastic and would be impressed if we just showed poppies and lupines! There are also those who come looking for mistakes. And there are people who bring us things! One man brought us a rattlesnake in a paper bag; he had caught it while hiking on the trail over Mt. Tamalpais. Why he thought we needed a rattlesnake at a wildflower show boggles the mind. However, we found a jar and a glass frog to fit the top and put the snake on display. Always, someone will bring in a "wildflower" saying that we do not have it. We have to explain that it may have grown in the wild but it is an "escape." They rarely understand! Then there is the person looking for her favorite flower—just because it blooms in August is a poor excuse for us not to have it in May!

In the early days we were easily intimidated by people's doubts as to our

identifications. We have discovered that if we "speak with authority," or ask whether Jepson (*Manual of Flowering Plants of California*) or Munz (*A California Flora*) is being used, we can stop all but the expert.

We keep a card file of all the labels we have used through the years, with common name, scientific name, family and distribution. People are interested in exact locations, so we try to have one of them for each flower. We do try to keep the collections from different areas separate, as it helps in identification.

Each year we have a special feature. During the first years we had dioramas, or scenes of plant communities, such as seashore, chaparral, redwoods, etc. These became too time-consuming so we had to give them up. The last few years we have done the Conifers, the Ferns of California and the Shrubs of Mt. Tamalpais. We try to do a special arrangement for both the tea table and the mantel. These special exhibits are always popular.

We have been approached by several groups to sell something or promote some cause. Since one of our biggest objections to other shows was the carnival atmosphere, we have been very selective of what we allow. We have happily given space to The Nature Conservancy, Audubon Canyon Ranch and, more recently, Kent Island, which is near and dear to our hearts.

When people begin to arrive on Saturday morning, and up until closing time, we have our joyous moments of discussing the flowers and where we found them, and of meeting old friends from previous shows and making new ones. Late Sunday afternoon, students and collectors come and take specimens for herbaria and student projects. There are artists who want flowers to paint, and people who want flowers for shut-in nature lovers, and finally the people who just can't resist taking them. Most of the flowers are gone by the time the doors are closed. We then sit down to our traditional mint julep to relax with husbands and friends and talk over all the fun and satisfaction of one more show. ♦

Its glass-enclosed courtyard garden is naturalistic yet patterned to serve an architectural purpose

FORD FOUNDATION'S OUTSIDE-IN BUILDING

Joan Lee Faust

From the NEW YORK TIMES, March 17, 1968. © The New York Times Co.
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THE handsome new Ford Foundation building in New York is not only beautiful to look at, but in its design concept is a fresh and radical change from the four-sided, glassed-in box.

Tradition has been blown to the wind by the architects, Kevin Roche, John Dinkeloo and Associates, heirs of the late Eero Saarinen, and they have planned a building with the outside in. Rather than set it back from the street with a foreground plaza of paving and plants, they have used the entire 200-foot square space and enclosed a garden in the building, a court that is 156 feet high from the

ground to the skylight above.

Glass walls provide light for the air-conditioned court on the south and east sides, while L-shaped office space forms the walls on the west and north and looks out into the court. The garden area measures about one-third of an acre.

Terraced Hillside

The court's plantings, designed by Dan Kiley, are essentially from the north temperate zone and suggest a terraced, wooded hillside. The 13-foot grade slopes downward from the main entrance on 43rd Street between First and Second



The New York Times by Sam Falk

The jacaranda is important among the many evergreens for its branch structure.



Cryptomeria towers in forest of glassed-in court of Ford Foundation's new building.



Daffodils in sunken pots are part of displays which are changed every two weeks.

Avenues. Dark brick walks and steps weave through the court in a geometric pattern related to the building's design. At the lower level is a square pool planted with aquatics.

The woodland understory is primarily southern evergreen azaleas, camellias and pieris with a ground-cover of ferns, baby's tears (*Helxine*) and a species of *Zoysia* grass.

The trees—37 of them—are already towering specimens. Thirty-five-foot southern magnolias are the boldest in appearance. Two species having more sculptured branch structure are sharpleaf jacaranda, a Brazilian tree, and the red ironbark eucalyptus. For more evergreen texture, there are specimens of handsome Japanese cryptomeria, 30 feet tall. For color effect throughout the year, 250 6-inch pots of small flowering plants will be moved in about every two weeks.

Don Kiley explains that his goal was to fill the vertical void; to develop the large spatial quality, not to just decorate an interior. The planting will be a grove of architecture with the forms of the tree trunks rising up to the 150-foot heights.

The trees' roots go right down to the

subsoil. Specially prepared soil was mixed before the planting began and proper drainage had to be installed. A fiberglass soil separator prevents this soil from being washed down into the gravel drainage layer. Excess drainage water is carried off in a special line. Condensation from the air conditioning is also collected in a cistern in the southeast corner of the building so that watering will be possible even during a period of water rationing. An underground watering system with pop-up sprinkler heads and a sensor system for fertilizer needs is also installed.

The garden is lighted at night with 76 spotlights from the 10th floor overhang. Forty-three lamps are set in the ground. And on the third, fourth and fifth floors are set-back planters which feature azaleas and flowering vines, especially bougainvillea.

The Ford Foundation's new \$16 million building is headquarters for the nation's largest private philanthropic foundation. The garden court is open to the public weekdays from 8 A.M. to 6 P.M. and on Saturdays from 8 A.M. to 1 P.M. It is closed Saturday afternoon and all day Sunday. ♦

*Compared to other kinds of diseases,
our knowledge of viruses is meager*

VIRUS DISEASES OF SHADE TREES

George N. Agrios

Condensed from TREES Magazine, July-August 1968.

SHADE TREES suffer from the kinds of contagious diseases caused by microorganisms that affect all other kinds of plants as well as animals and man. Although plant diseases are caused by fungi, viruses, bacteria and nematodes, in that order of importance, diseases caused by the other pathogens, especially fungi, have received a great deal more attention, and are better known in the case of shade trees than diseases caused by viruses. Most non-pathologists seem to be completely unaware of the existence of viruses in plants and of their often detrimental effects.

What Is a Virus?

A virus is a very simple microorganism that can grow and multiply only inside living cells. It is so small it can be seen only with the electron microscope and can go through just about any filter. A virus almost always consists of two substances: a nucleic acid and a protein. Viruses are either rod-shaped or almost spherical. In the rod-shaped viruses the nucleic acid, in the form of a spiral, forms a hollow tube and, outside this, there is another spiral tube made up by the protein of the virus. Spherical viruses are also hollow and consist of an inner jacket of nucleic acid and an outer one of protein.

The nucleic acid is really the part that determines what a virus is and what it can do. The protein simply forms a coat that protects the active part, the nucleic acid. All cells of living organisms, of course, contain nucleic acid, which is what determines the inherited characteristics of an organism and how these characteristics will be expressed. There are two kinds of nucleic acids in all cells: the one

(DNA) determines what kinds of genetic characteristics an organism carries, the other (RNA) does the things that need to be done so that these genetic characteristics will appear on the organisms. In some viruses the nucleic acid is DNA, in others, that is, most of those infecting plants, it is RNA.

How Do Viruses Cause Diseases in Plants?

Plant viruses are parasites that do not eat anything. They do not even seem to secrete anything. All they seem to be "interested" in is to multiply themselves. This can be done only in living cells of plants, especially young, active plant cells. The reason for this appears to be that viruses do not divide or otherwise multiply themselves but they must enlist the services of the plant cell to produce, instead of or along with other substances, more virus. The virus in the cell acts as an organizer or agitator that diverts the activities of the cell away from the normal ones so that the cell will use its energy and nutrients towards formation of more virus and of certain other substances prescribed by the virus. Some of the additional substances produced by virus-occupied cells lead to further anomalies in the cell activities. The result is a diseased condition in the cell which may be expressed as reduced or excessive growth and division of the cell, loss of the ability to form certain needed substances such as chlorophyll, or, on rare occasions, as death of the cell. When many plant cells react to the infecting virus in the same way, the combined result of their reactions appears on the plant as symptoms. (Continued)

Symptoms of virus diseases usually appear on young, growing tissues or organs of plants such as leaves, twigs, fruit or young roots. Organs or tissues that were already formed before the virus infection are not ordinarily affected. It can be said that the virus itself does not "cause" any symptoms but, instead, the symptoms are produced entirely by the plant at the instigation by the virus.

Diseases Caused by Viruses

Our present knowledge of virus diseases of shade trees is, at best, meager. Several virus diseases of shade trees, or their counterparts in the forest, have been described in the United States, Europe, and Asia. Several more virus-like diseases of shade trees have been observed, but proof that they are caused by virus is yet to be produced. The identity of the viruses found to cause diseases on shade trees is not yet certain, especially since it has been shown that viruses originally described on hosts such as peach, tobacco, tomato and carnation can also infect shade trees of the stone and pome fruit groups. Some shade tree viruses are briefly described below.

Elm phloem necrosis virus. This virus disease occurs in the Midwestern and Central states where it is second only to Dutch elm disease in destructiveness. In some communities this disease killed 50 to 75 per cent of the elms within a few years. The foliage symptoms resemble those caused by Dutch elm disease. The leaves are few, greenish-yellow, and finally turn brown and fall off. Trees usually die within 1 to 2 years following infection, although elms infected early in the season may die within 2 to 3 weeks from the appearance of symptoms. The virus causing the disease is spread from tree to tree by a leafhopper or root grafts. The phloem layer of infected trees becomes yellow to butterscotch and finally black or brown in color, and it gives off an odor of wintergreen which is helpful in diagnosing the disease.

Elm mosaic virus. This disease is widespread and may cause only mild mosaic symptoms on the leaves, or it may be

severe, causing the production of small, distorted and mottled leaves. It may also inhibit buds from opening, resulting in a tufted appearance and wild brooming. Infected trees grow poorly and decline slowly but are seldom killed. The virus is spread from tree to tree in infected pollen and in seeds and also through grafts made on roots.

Elm scorch virus. It has been reported from Washington, D.C. and the Southeastern states. It causes necrosis or scorching of leaf margins or entire leaves and may cause death of the trees. The virus is in the xylem of trees. It is probably caused by the same virus causing a most serious disease of grapes and alfalfa.

Elm zonate canker virus. It has been reported from New Jersey to Missouri. It causes spots on leaves and small cankers, appearing as concentric rings, on the bark of stems and branches. Branches that are heavily affected by cankers will die back.

Peach rosette virus on maple. It occurs in the Southeastern states. Infected trees become severely stunted and have dense green foliage. Decline and death may follow within 3 to 4 years from the time of inoculation.

A virus causing yellow mosaic or mottling on maple leaves has been reported from Europe and Japan.

Ash ring-spot virus. Found in the Northeast, the virus produces spots, rings and line patterns on leaves of infected trees. It has been found associated with trees exhibiting what is known as ash dieback.

Ash witches'-broom virus. It has been reported from the Southern states and causes the production on branches of multiple, wirelike shoots that have small, yellow leaves. The leaves on brooms usually persist on the tree later than normal ones.

A virus that produces necrotic spots and curling of the leaves has been reported from Europe on ash. Another virus causing ash mosaic has also been reported from Europe.

Birch line pattern virus is present in



John R. Whiting

The 'Hamburg' elm is an example of a shade tree resistant to certain diseases.

Canada and the United States. It causes a pattern of discolored, oak-leaf-shaped lines on the leaves.

Linden cowl-forming virus. Found in Europe. The leaves of infected trees appear rolled and cup-shaped. It can also infect elm.

Linden little leaf virus. Also in Europe. The leaves are very small and mottled. Flower production is greatly reduced. Branches may decline and the entire tree dies.

Black locust mosaic virus. In Europe. Mosaic symptoms on leaves and reduction of tree growth.

Black locust witches'-broom virus. Widespread in Europe and the United States. It causes vein-clearing on leaves,

premature defoliation and production of brooms on sprouts, branches and terminals.

Poplar mosaic virus. Widespread in Europe. Mosaic symptoms on leaves, sometimes accompanied by leaf rolling, distortion, defoliation and reduced tree growth.

Horse-chestnut mosaic virus. In Europe.

Horse-chestnut necrosis virus. Also in Europe. It reduces tree growth and flower production. Leaves become rolled and develop necrotic spots.

Oak mosaic virus. In Europe.

Walnut bunch virus. Found in the eastern United States. It produces bunched, wiry shoots on main stems and branches. Leaves small and yellowish.

Low fruit production. Branches die back and entire trees may die.

Mountain ash mosaic. In Europe.

How Serious Are Virus Diseases of Shade Trees?

First, it is clear that shade trees are affected by viruses, but so far we know only a very small portion of them. Second, the destructiveness of some of these viruses, for example, elm phloem necrosis, shows that virus diseases of shade trees can be very serious indeed. It is altogether possible that, as we begin to study the shade trees more closely, we will find many more viruses affecting them than we know of today. It is also possible that many of the unexplainable disorders of shade trees will be shown to be caused by viruses.

Shade trees live for many years and during this time they are visited by a number of kinds of insects, nematodes, and so on, which could transmit viruses to them. Once a tree or other plant becomes infected with a virus it remains so. Trees propagated vegetatively will almost always carry the virus(es) present in the mother stock tree. Vegetative propagation of shade trees is becoming increasingly popular and the possibility of perpetuating and spreading viruses in this manner is a real one. Planting shade trees at close distances also helps viruses spread from tree to tree through natural root grafts. Symptoms of virus diseases are often mistaken for symptoms caused by drought, cold injury, soil compactness, or other environmental conditions. The efforts made towards remedying the disorder fail to take into account the ability of the disease to spread more or less rapidly.

Controls for Virus Diseases of Shade Trees

When a tree becomes infected with a virus, it spreads throughout the tree and remains until the tree is dead. By the time symptoms appear on some part of the tree, the virus has already spread to an unknown extent within the tree and, therefore, pruning or other sanitation

procedures are ineffectual in attempting to stop the spread of the virus. Chemicals that could be used as sprays or injections for controlling the virus within the tree are not yet available.

Control of virus diseases of shade trees depends on several protective measures. Only virus-free plants should be bought and planted. This can be achieved only by a concerted effort on the part of nurserymen to propagate trees from virus-free mother stock trees which are indexed periodically to ascertain their freedom from virus.

When a serious virus disease is present in the area, varieties or clones of trees known to be resistant to the particular virus should be chosen for planting. Once a virus-free tree has been planted, it can still become infected with one or more viruses during its long life span. A growing tree can sometimes be protected from being infected with a virus when the method of spread of the virus is known and means of checking its spread are available. An insect-transmitted virus, for example, could conceivably be checked by controlling with insecticides the insect that spreads the virus. For a number of reasons, however, this method of control of tree viruses is seldom satisfactory, since a few insects almost always manage to feed on a sprayed tree long enough to transmit the virus before they are killed by the insecticide. Viruses are sometimes spread through pollen, which at present seems impossible to control. The methods of natural spread of most shade tree viruses are at present unknown, however, and much more information is needed in this area before control measures can be formulated.

Although no chemicals are available to kill or inactivate the virus once it is inside the tree, certain chemicals belonging to the group of plant hormones can counteract some of the effects of the virus on the tree and enable the trees to produce a fairly normal growth or yield. These hormones, e.g., gibberellin, seem to have little effect on the virus but they stimulate plant activity which may offset the effect of the virus on the plant. ♦



WELL-TRAINED HEDGES

The ubiquitous privet stands undisputed as a superior hedge plant. The trimmed hedges here, all at garden of A. Wallace Chauncey, East Hampton, N. Y., show privet's adaptability to shaping for sculptured effects. The plants, 35 years old, were set 8-12 inches apart and kept at 10 feet by shearing three times a summer.



NEVER BE AFRAID OF SAWDUST AND WOOD CHIPS!

Here are the most-often-asked questions and straightforward answers about using sawdust and wood chips

George Abraham

Condensed from ORGANIC GARDENING AND FARMING, June 1968.

SAWMILLS create mountains of sawdust for the asking. Wood-chipping machines are grinding up cut-down trees, making piles of wood chips available to home gardeners. These valuable materials—ideal for mulching and excellent soil-improvers—contribute humus to our garden soils.

Here are the questions gardeners most commonly ask concerning the use of sawdust:

Is sawdust poisonous to soils and plants?

No. Sawdust and other wood wastes such as shavings, chips, shredded bark and brush clippings contain no more toxic elements than do peat moss, compost, manure or other organic materials.

Does sawdust (or chips) make soils acid or sour?

No. This is an old wives' tale. Most kinds of sawdust from the sawmill are slightly acid, but nothing to worry about, since most plants like a slightly acid soil. Actually, sawdust often causes a slight decrease rather than increase in acidity.

Does sawdust turn plants yellow?

Yes, it can—if you don't add fertilizer. Like straw, root stalks and similar once-living items, excessive amounts of sawdust or chips can make plants turn yellow, simply by causing a temporary shortage of nitrogen in the soil. Fungi and bacteria decompose sawdust, and in so doing use up nitrogen. Sawdust and chips are low in nitrogen—less than one per cent. However, you can offset the temporary "robbing" of nitrogen from plants by adding any nitrogen fertilizer to the sawdust.

How is sawdust used as a mulch?

Sawdust or chips make an excellent mulch for apples, peaches, pears and other tall fruit trees. Both are fine for blueberries, asparagus, strawberries and also for all kinds of shrubs, flowers and vegetables.

Apply a sawdust or chip mulch about 3 or 4 inches thick to the base of trees, or in rows.

Will sawdust harm roses, perennials or other flowers?

No, along with wood chips, it makes a fine mulch on roses, hedges, evergreens and borders, as well as around annuals and perennials. Don't use sawdust on a lawn, however, as it will smother grass.

How do you use sawdust in the vegetable garden?

If your soil bakes hard and dry, or if the sandy soil dries up quickly, add the mulch after a rain (or hosing) to trap moisture. In the small home garden, spread sawdust at the rate of 4 bushels per 150 square feet, or about 3 inches thick during summer, then spade or plow under in fall or spring after some nitrogen has been added. With our horse population the highest it's been in years, it is possible in many localities to obtain farm manure where sawdust has been used as a bedding material. Sawdust absorbs valuable urea which contains nitrogen. Use the material in the garden in fall so it can weather all winter. Or, if you have some weathered material, use it any time in the flower bed, vegetable garden or around ornamentals.

What can be done to "beautify" sawdust?

If you object to the "cheap" color of fresh sawdust, you can scatter a thin layer of peat moss over the sawdust mulch to give it the "peaty" look. After sawdust weathers a few months, it turns brown and resembles peat.

Does it make any difference if sawdust is fresh or weathered? Hardwood or softwood?

No. Sawdust can be used fresh or weathered, and from either softwood or hardwood trees. The main thing to remember is that you have to supplement it with some extra nitrogen to offset any temporary shortage of the plant nutrient. Sawdust scattered on a compost pile helps add valuable humus to your stockpile.

Will sawdust attract mice?

Any mulch close around fruit trees is apt to, but you can keep rodents out by using screens or cylinders of hardware

cloth wrapped around the base. Apply mulch 4 inches or so thick around the protective barriers.

How about sawdust or wood chips from walnut trees? Harmful?

No. While it is true that live walnut tree roots will exude a chemical through the roots which poisons some crops such as tomatoes, potatoes and other vegetables, there's no evidence that wood chips or sawdust from a cut walnut will produce the toxic material. Once a walnut tree has been cut, it has lost its ability to secrete the substance known as juglone. Dead walnut stumps do not produce it either.

How about shredded bark as a mulch?

Fine, if it's free or you don't have to pay much for it. Bark has the same advantages that wood chips and sawdust have. It usually looks attractive and needs extra nitrogen. ♦

Organic Gardening



Wood chips for a mulch



Compost and sawdust

The combination permits the growing of earlier vegetable and flowering plants...

HOT AND COLD GARDEN FRAMES

Bette Wahlfeldt

Condensed from ORGANIC GARDENING AND FARMING, April 1968.

WE KEEP OUR GARDEN going 12 months a year out here in Mahomet, Illinois, where the winters can be long, dark and cold, with two kinds of frames—hot and cold.

The hot frame sits indoors, heated by a 30-foot electric coil which cost us \$5, while the 3-by-8-foot cold frame nestles against the south side of our storage shed, sunk about one foot into the soil. Combined with our garden patch and a small 7-by-12 greenhouse, these two welcome accessories give flexibility and certainty to our ornamental- and vegetable-growing programs, plus a little cash.

The cold frame was built in two weekends with 3-inch wood and used materials. Our 3 salvaged 2½-by-3-foot window

frames determined the size of the frame—8 feet wide by 3 feet deep. But they saved us \$27 of an estimated \$36.60 total, which is what our cold frame would cost if built entirely of new materials.

In the spring, we use the cold frame as a storage shed for flats and containers of young seedlings started in the hot frame and greenhouse. This gives us room for new batches of seedlings in our two growing units, and allows us to get on with our growing timetable. The plants are watered generously each morning, and the roof is held open during the day, but closed at night.

Our system saves a lot of laborious transplanting first to flats, then to cold frame, and finally from cold frame to



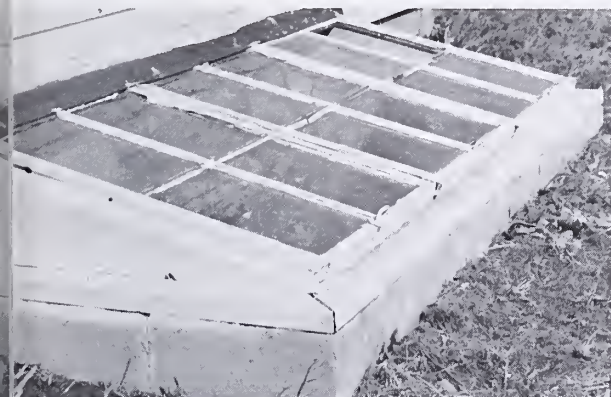
In spring, the cold frame is storage for flats and containers of seedlings that were started much earlier in the hot frame.

garden. Now our plants are disturbed only once as they go into their permanent sites in the garden. The 3-by-8 cold frame will comfortably hold about 1,000 plants in the seedling stage.

A southern exposure window is a good place to install your electrically-heated hot frame, if you don't have a greenhouse. Our 3-by-3½-foot box is lined with tinfoil, covered with an inch of sand on which the coil is carefully seated. Be sure it does not have any "crossovers," because it will overheat at that point and burn out. After pressing the coil carefully into place on the dampened sand, fill the box to the top with more sand. Water twice a day because the bottom heat

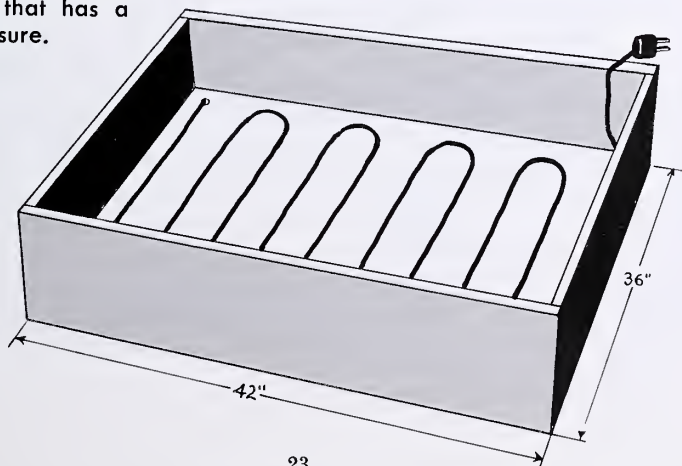
causes the sand to dry out rapidly.

We have found it safer and better to start our annuals in a hotbed. We used to have trouble raising the precious high-bred double petunia until we used the hot frame method. Now they are sown on the sand in early March and covered with a thin layer of potting soil. The plants are ready for transplanting into plastic containers, 12 to the box, by early April, some before. The same is true for marigolds, asters, zinnias and many other annuals that we raise for our own use and resale. Vegetable seeds such as those of tomato, cauliflower, cabbage, pepper and many others get their start in our hot frame. ♦



The cold frame has a southern exposure. It is built of cement blocks and salvaged 2½-by-3-foot window frames.

Hot bed is used indoors in a window that has a southern exposure.



Plants in the home greenhouse may not receive enough carbon dioxide in winter...

CARBON DIOXIDE ENRICHMENT FOR A SMALL GREENHOUSE

John W. Mastalerz

Reprinted from FLOWER AND GARDEN, November 1968.

DEFICIENT levels of CO_2 frequently occur in greenhouses when outdoor temperatures are low and ventilators must be kept closed to hold in the warmth. The problem is especially critical on clear cold days. In the bright light, plants are carrying on photosynthesis at a relatively high rate, and the CO_2 supply is soon depleted.

Carbon dioxide is one of the essential raw materials for photosynthesis, the process by which green plants use the energy of light to manufacture carbohydrates. Carbohydrates are the building blocks for plant growth. So it follows that whenever either carbon dioxide or light are limited, plant growth is reduced.

The simplest and cheapest method for solving a CO_2 shortage is to open the greenhouse ventilators, because fresh air carries a large supply. Ventilation of a greenhouse may be as important for replenishing CO_2 in the air as it is for controlling temperatures. The exchange of air resulting from ventilation will quickly bring the level of carbon dioxide in a greenhouse up to 300 parts per million, the same level as in our normal outdoor atmosphere. But as every home greenhouse operator knows, it is almost impossible to let in much outside air during the winter without subjecting plants to killing or damaging cold drafts. So the problem is to find another more satisfactory way to supply CO_2 inside a greenhouse.

Commercial greenhouse people have worked on this for several years, and have developed techniques of adding CO_2 as a manufactured gas, or as a product of

combustion. With these methods, they can raise the carbon dioxide concentration economically to 1000 to 1500 parts per million. Actually, in research with flower crops, workers have found that concentrations up to 3000 parts per million will increase both yield and quality, particularly quality. They usually find, with most plants, that the improvement in quality justifies the extra cost of adding CO_2 to the air.

In home greenhouses, the best sources of extra carbon dioxide enrichment are dry ice, compressed gas in cylinders, and combustion of alcohol. For greenhouses larger than 20 x 50 feet, CO_2 generators that burn propane gas are available. The different sources of CO_2 all have their practical advantages and disadvantages. It will not matter to the plants where the CO_2 comes from, unless it contains toxic impurities (an unlikely event in the sources given here).

Because plants can use carbon dioxide only when light is available, it is useless to release CO_2 in a greenhouse at night. In fact, doing so may be harmful if the level builds up too far. Should you need to open ventilators for temperature control, better shut off the CO_2 or most of it will be lost through the open vents. In the northern states, the effective months for adding CO_2 in greenhouses are October through March. In southern states this season may last from December through February.

Dry Ice

Dry ice is simply carbon dioxide in a solid state. It is more expensive than

other forms of CO_2 but has the advantages of being easy to handle without special equipment, and completely free of toxic impurities. All you need is a deep freeze compartment in which to store it. You can use the same freezer in which you keep frozen foods. To use dry ice to enrich the CO_2 in greenhouse air, simply place a block of it on the walk. As the temperature of dry ice increases, the material changes slowly into the gaseous state, diffusing carbon dioxide throughout the atmosphere.

The amount needed is about 3 ounces per hour, or $1\frac{3}{4}$ lb. per day per 100 square feet. This will maintain the CO_2 at a level of about 2000 parts per million. Put a fourth to a third of the dry ice quota for the day out in the morning, a few hours after sunrise. Divide the remainder into two or three equal portions and release them at regularly spaced in-

tervals during midday, making the last application not later than 3 p.m. Obviously, this is going to take some time and attention. I am sorry to say that no automatic distributing devices for dry ice in home greenhouses have yet been marketed.

Compressed Gas in Cylinders

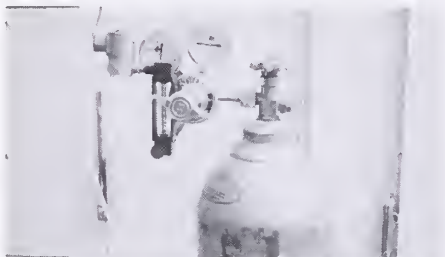
Carbon dioxide can be purchased compressed in cylinders. (Look under "carbonic gas" in the yellow pages of a local phone book.) This form is particularly suitable for small greenhouses, because it is pure, readily available, easy to couple into an automatic applicator, and the cost is less than that of dry ice. To make an automatic applicator, you will need a pressure regulator to fit the CO_2 cylinder, a flow meter, and a solenoid valve controlled by a 24-hour electric time clock. Although a cylinder of CO_2 is



Greenhouse chrysanthemum at right was grown with additional carbon dioxide and shows gained achieved by the enrichment. Plant at left had no addition.



Dry ice on greenhouse walk adds CO₂.



Adding compressed CO₂ automatically.



Alcohol-burning lantern adds CO₂.

heavy, the supplier will deliver it directly to your greenhouse. You can set up the cylinders and regulating equipment either in the greenhouse or in an adjacent workroom. If in an adjacent room, connect with the greenhouse by ¼-inch polyethylene tubing.

Use a flow rate of 1½ to 2 cubic feet of carbon dioxide per hour per 100 square feet of greenhouse floor area. This will give a level of about 2000 parts per million. Turn the gas on at sunrise and shut it off a half hour before sunset. The largest cylinder available contains 60 lbs. or about 522 cubic feet; and at the rates recommended in a small greenhouse it will last about four weeks.

Combustion of Alcohol

This is more economical than dry ice or compressed gas. Alcohol burns cleanly and without producing toxic fumes. I suggest that a kerosene lantern be used as a burner, to enclose the flame and reduce danger of accidental injury or fire. Both ethanol and methanol burn with a colorless flame in sunlight.

To maintain a CO₂ level of 2000 parts per million by this method, you will need to burn two to three fluid ounces of ethanol, or three to four fluid ounces of methanol, per 100 square feet of greenhouse floor area, per nine-hour day. You can calibrate the rate of burning by measuring how much alcohol is needed to replenish the font after a specified length of time; then adjust the flame to burn more or less until you reach the right rate. It will do no great harm to let it burn above or below the ideal for a few days. In a small greenhouse an unwanted side effect of alcohol burning may be heat. If the burner warms the greenhouse so much that opening ventilators is necessary you will lose part of the effectiveness of the CO₂ enrichment. Combustion also produces water vapor as a byproduct, but this should not interfere with plant growth.

There is no need to be concerned about human safety or health in greenhouse atmospheres enriched with CO₂. Human beings can tolerate continuous exposure to 5000 parts per million of carbon dioxide for eight to nine hours a day. If the 2000 parts per million level recommended is not exceeded, have no qualms about working in the enriched atmosphere.

Indulging plants in a CO₂-rich atmosphere gives no excuse for neglecting their other needs. They will still require good light, temperature, moisture and fertility conditions if they are to show improvement in growth and quality. When all factors are optimum, however, it is possible that plants will grow so well you will want to change some of your planting, watering, or fertilizing practices to produce the sort of plants you desire. ♦



Photograph by Author

A coconut plantation on the slopes of Mayon volcano on Luzon in the Philippines destroyed by cadang-cadang. In this last stage, only a few crowns remain.

THE RIDDLE OF CADANG-CADANG

A serious disease ravages valuable coconut plantations

Karl Maramorosch

A MYSTERIOUS DISEASE called cadang-cadang of coconut palms in the Philippine Islands has killed over 30 million trees during the past 40 years. The disease threatens the economy of the Philippines, where coconuts are the major export and \$200 million are derived yearly from the sales of copra, coconut oil, and shredded coconut meat. The spread of cadang-cadang is a danger to the coconut industry in Malaysia and Indonesia.

The disease (cadang-cadang means "slowly dying" in Bicolano, a language of southeastern Luzon), causes affected palms to die very slowly over a period of 10 to 12 years. It first appeared around 1928 on a small island, San Miguel, off Luzon. In 15 years, all palms of the 225,000 palms on San Miguel were de-

stroyed. The disease has spread to the mainland of Luzon and nearby islands; it has now reached the heart of the coconut-producing area near San Pablo, Laguna Province and Santa Cruz in Batangas Province.

The earliest recognizable symptom of cadang-cadang is the appearance of tiny translucent spots on the pinnae of young leaves. The fronds of diseased palms gradually assume an erect position in the crown, die and drop off. Finally, after several years, the bud dies and breaks off, leaving only the crownless trunk.

The spread of the disease indicates it is infectious and not the manifestation of a nutritional disorder. Fungi and bacteria were easily ruled out because neither was found associated with the disease. This left a virus, probably one carried from

palm to palm by an insect vector, as a possible cause of the disease. However, no such carrier has yet been found, nor has it been possible to transmit the disease experimentally.

Cadang-cadang moves relentlessly from area to area, striking indiscriminately in valleys and on volcano slopes. It hits all palms including imported varieties. A group under the leadership of Dr. W. C. Price, formerly from Florida State University, is trying to solve the riddle. The research is being sponsored jointly by the Philippine Government and by an organization within the United Nations.

A recent discovery of a whole new group of pleuropneumonia-like agents of plant diseases (PPLO or *Mycoplasma*-*tales*) opens another avenue of study which has not yet been explored. These disease agents of plants, until recently erroneously grouped with viruses, have now been recognized as the cause of aster yellows, corn stunt, and several other plant diseases. If a *Mycoplasma* agent were found to be the cause, there would be a good chance that the disease could be successfully and economically controlled by use of an antibiotic or other antimicrobial agent. ♦

Conifers—Promising Source of New Drugs for Cancer

Condensed from AMERICAN HORTICULTURAL JOURNAL, Fall 1968

THE CONIFERS are proving a fertile area in a search for anti-cancer drugs. Since 1960, Agricultural Research Service botanists have supplied more than 17,000 plant samples, representing about 10,000 species, for anti-cancer screening. This program, conducted in cooperation with the Cancer Chemotherapy National Service Center of the National Cancer Institute, has demonstrated significant anti-cancer activity for about 800 species in 133 plant families. The greatest concentration of plants with this capacity is among the conifers. To date, 146 species in 28 genera have been tested. Sixty conifers in 16 genera have shown sufficient activity against cancer in laboratory animals to justify intensive fractionation to isolate and identify active chemical constituents.

The most promising compounds isolated from conifers are alkaloids. Two alkaloids have been isolated from species in two genera. An example is taxol from the bark of *Taxus brevifolia*, a native of the Pacific Northwest. Both alkaloids show significant activity against mouse and rat tumors. A chemical substance isolated from a species of *Pinus* is very promising. Its chemical structure is yet to be determined.

An intensive effort is being made to find as many samples of conifers, cycads, and other gymnosperms as possible. Samples from botanic garden specimens are welcome. We are especially interested in obtaining samples of the conifer genera *Acropyle*, *Actinostrobus*, *Agathis*, *Amentotaxus*, *Arceuthos* (*Juniperus drupacea*), *Athrotaxus*, *Austrotaxus*, *Diselma*, *Fitzroya*, *Fokienia*, *Microcachrys*, *Neocallitropsis*, *Nothotaxus* (*Pseudotaxus*), *Pherosphaera*, *Pilgerodendron*, *Saxegothaea*, *Sciadopitys*, *Tetraclinis* and *Widdringtonia*. We also wish to obtain samples of *Gnetum* (*Gnetaceae*) and all available cycads.

Appropriate information will be appreciated and may be forwarded to me at the New Crops Research Branch, Plant Industry Station, Beltsville, Maryland 20705.—Robert E. Perdue, Jr.

*Choice specimens from the Brooklyn
Botanic Garden exemplify*

THE IMPORTANT CHARACTERISTICS OF BONSAI

George S. Avery

Adapted from HOME GARDEN & FLOWER GROWER, October 1968.

WHILE there are no hard and fast rules as to what makes one bonsai "better" than another, there are some important criteria toward which to work as they are being trained.

To be considered a bonsai of quality, a specimen must have most of the qualities illustrated in these pages. These qualities

are subjective appraisals, and in every case are matters of degree. How tapering should be the "tapering trunk"? How small must the foliage or flowers be for "proper scale"? It is questions such as these that make the training of bonsai more an art than a science.

Some of the criteria are elements of

Seasonal interest

If a bonsai is deciduous—as is this golden larch—the bare shape should be beautiful. If it is a plant with berries or flowers they, too, should be attractive in their season as well as being diminutive in size.



All Photographs by Howard Graff

basic design that apply to the understanding and appreciation of art in all its forms. Harmony and balance and the articulation of shape are important in sculpture, architecture and the graphic arts. Thus it is that working with bonsai is by no means an esoteric Oriental pastime. It is part of a larger world of art and design.

Counting the bonsai in various stages of development at the Garden, the number comes to nearly 500 in all. About 10 per cent of these can be considered outstanding specimens and the seven shown here are among the best of this exclusive group. Here they are seen against the background of the Hill and Pond Garden, which in itself is a venerable example of Japanese garden design.

While only the perfect bonsai could meet all the criteria illustrated in this 8-page section, if you look carefully you will see that these have most of the attributes. Thoughtful appreciation is basic to the enjoyment of bonsai. Only through the study of fine examples of the art (and observation of forms in nature) can one develop a feeling for the "spirit of bonsai." This spirit is a palpable thing.

When a bonsai is "right" there is an obviously satisfying harmony within the plant itself and in its relationship to the container. A bonsai is no less than living sculpture. The deep satisfaction of training the plant lies in the knowledge that one is practicing an ancient and honorable art.

More Examples of Important Characteristics of Bonsai . . .



Tapering trunk

Any bonsai with a tapering trunk has more character and interest than one with a thin spindly stem. It is not only a better overall design, but it more accurately represents a tree in its mature form. This flowering crabapple had its trunk thickened by successively cutting back the top of the stem. Plants are grown for a few seasons in the ground so the trunk develops while root and top growth is controlled.



Expressive roots

This "forest-planting" of trident maple is properly planted so there is the illusion that sheet erosion over the years has washed the soil from around the roots. Moss on the soil and lichens on the exposed roots add to the natural look. In the "stone clasp" bonsai, exposed roots are more of a feature, but in all good examples the supporting role of the root is accentuated.



Small foliage

Not only should the leaves be in approximate scale with the trunk—so should any flowers and fruit the plant may bear. Constant nipping out of growth forces smaller new leaves to form. It takes more or less constant attention to keep the foliage at a size that is in proper balance with the plant and container. Shown here is the Chinese hackberry.

(Continued)



Balanced asymmetry

While some bonsai of the "formal" upright type may seem to be symmetrical, every good specimen employs the interesting qualities inherent in asymmetrical design. This cut-leaf Japanese maple, for example, has sprays of foliage with irregular shapes but the masses and voids work together to create a unified whole. Note, too, how the off-center planting makes the composition far more intriguing.



Proper relationship of plant to container

This is, perhaps, the most subtle of all criteria and certainly one of the most important. And, of course, it is entirely subjective. If the container shown here were any smaller, or the Japanese maple any larger, they would be out of balance. As they are, the relationship is just right. The elegant detailing of the container is also in character with a similar quality in the foliage.



Articulated shapes

Visualize this Mugho pine as a solid mass of needles—which it could become if not selectively pruned. How much more interesting it is when the foliage is "cloud" pruned. Here the bone-structure assumes character because of the open space left between masses of foliage. This, too, is typical of pines on a wind-swept coast or mountainside where only the growth nearest the supporting limbs can manage to survive.



Enkianthus perulatus/30-40 yrs.

Dwarf pomegranate/60-70 yrs.
(*Punica granatum nana*)

*7 Choice Bonsai from the
Collection of the Brooklyn
Botanic Garden*

(Continued)



Japanese maple/70-75 yrs.
(*Acer palmatum*)

Scrub pine/75-100 yrs.
(*Pinus virginiana*)



Japanese white pine/250-300 yrs.
(*Pinus parviflora*)

(Continued)



Chinese hackberry/80-90 yrs.
(*Celtis sinensis*)

Trident maple/50-60 yrs.
(*Acer buergerianum*)

*Most bonsai fanciers dream of hurrying
the development of their plants...*

FIELD-GROWN BONSAI

B. F. Bruenner

Condensed from HORTICULTURE, November 1968.

BECAUSE of lack of time to tend a large collection of trees, I have been growing my bonsai to maturity in the ground for the past 25 years, transferring them to pots for display only when, for all practical purposes, the basic form and size has been established. At this time they are 1 to 2 feet high with compact root systems, good sturdy trunks and suitable primary branching. All that remains to be done is to give the final touches and corrections that transform the plant into a true bonsai.

Advantages and Disadvantages

To my mind there are many advantages to this method. Since growing conditions are better and more uniform in the ground, much faster maturity will be obtained. Trees 5 years old will at least have a surface root growth and trunks comparable to pot-grown trees twice as old. General care is also much less. Watering and fertilizing will be much less frequent and winter care almost negligible. Another important advantage is that several hundred trees may be grown in a small space with the result that one's final choice for potting is vastly increased. Out of a hundred trees so grown, perhaps 10 will turn out very well, whereas out of 10 pot-grown trees, one or two may. The percentage may not be bigger but the actual number of successful trees will be.

Individual trees, even of the same species, often have a greater natural potential for bonsai than others and, again, the more trees one starts with, the more trees will be found with this desirable characteristic. I have found that grafting takes place more easily in the nursery row, and as is well known, trees collected from the

wild have a much greater chance of survival.

Now for the disadvantages: For the most part, the faster growth makes it more difficult to keep the trees under control. Scars from training wires are more frequent. Top growth often becomes so vigorous that it is difficult to get a fine taper to the trunk. Real dwarfing will not take place as long as this vigorous growth is going on so that often the trunks, while sturdy, will have the smooth look of youth rather than the rough-textured look of old age. Training during the season is more difficult and hard on the back. For this reason the major part of the training is done at the time of the yearly transplanting when the trees are out of the ground. Another disadvantage is that the trees are more subject to injury from natural conditions such as snow, wind, animals and people. Lastly, one cannot possibly give the daily fine attention to so many. To me, however, the advantages outweigh the disadvantages. I find that by this method I can end up with a few good trees in pots plus many in the ground to choose from later.

Kinds of Trees

The sources of the trees are the same by either method: seedlings, nursery stock, collected wild trees and grafts. I began with common alder seedlings that grow by the hundreds as weeds in my garden. They made marvelous practice material but I soon learned that the large leaves are not suitable for bonsai. So, I changed to the smaller-leaved hawthorns of which I also had many. In addition I had numerous cherry seedlings which formed fine trunks and were later grafted

with flowering wood from more ornamental varieties. Another early useful source was pine and hemlock seedlings which are easily available in the wild state in my part of the country and which are more easily transplanted than older wild trees.

Thus, I suggest that whatever common seedlings are available be used at first as practice material. The experience is invaluable, the cost nothing and the trees may be discarded if unfit. Concentration at first on a single, available, cheap source will provide experience and build confidence which may be applied to many different kinds of material. If, however, small-leaved species are available to begin with, one may gain the experience and end up with some fine eventual results, too. But the experience is the more valuable. Once it is obtained, older trees may also be purchased singly or in small lots.

One of the best sources for practically readymade bonsai are collected wild trees, some of which may already be quite old and naturally dwarfed. These, too, do better in the ground where the root system may be reduced gradually and more successfully. Some of my best fruit trees came from a neglected orchard where the seedlings were dwarfed by cows that nibbled off the young shoots, producing good, stunted material.

My trees are grown on two small pieces of property I have in the country. However, the method may be easily applied on a smaller scale to a city lot. My two plots are approximately 40 by 60 feet each and are laid out in 40 foot rows, 3 feet apart. Seedlings and liners are planted 6 inches apart, more mature trees up to 3 feet. A small trench on each side of the rows facilitates watering. Approximately 500 trees are growing there at any one time.

The trees are transplanted once yearly, root-pruned, shaped and replanted. Very young trees require only the tap root cut. Allowing good root growth in other directions fosters top growth and earlier maturity. After a tree is older the roots must be carefully reduced all around to increase the roots close to the trunk and to decrease the overall length of the roots so

the plant may be put into a suitable pot. Transplanting may be done any time during dormancy. Deciduous trees are best moved in early spring, just as the buds begin to swell. Due to a lack of time and to the number of trees involved, I have some transplanting going on all winter at any time the ground is not frozen.

Training the plants is divided into two phases: one at the time of transplanting and dormancy and the other later, during the growing season. I dig the trees at the appropriate time, enclose the damp roots of each one with some soil in a plastic bag and transport them, a few at a time, to the city where I can work on them at leisure.

Very little is done to seedlings and young plants the first year, except trimming out of unwanted branches and wiring to shape the trunk if needed. The next year or two some decision has to be made regarding the ultimate height and shape of the tree. Trim out all unwanted branches and then pull the remainder into the desired places with paper-covered wire. The lower branches are tied into place to the root or lower trunk, upper branches to the ones below them.

Some traditional wiring is essential, especially on the lower branches. However, wire is difficult and time-consuming to put on, harder still to take off later and in cases of rapid growth it is likely to scar the bark. Bits of rubber (old inner tubing) will prevent much damage in either case.

Training during the summer with the trees at ground level is a different matter. Top and side shoots must be kept short and one must lie on the ground to get at suckers arising from the roots. Occasionally, for an overgrown tree that is sending out shoots in all directions I use large two-handled grass shears, sculpturing the tree roughly into a triangular shape and trimming the branches horizontally to create flat planes of foliage. The effect at first is somewhat like topiary but in a few months irregular growth hides the damage and the tree still retains the overall effect.



Avery

A nursery in Japan where plants for bonsai are grown in field rows to hasten stem enlargement.

Some growth, however, has to take place to hasten the final result. One way is to allow a carefully selected side shoot from the middle of the tree to grow several feet during the season. This will add girth to the trunk below it as nothing else will. The shoot selected to grow should be one that will not be obvious when cut off later flush with the trunk or branch from which it springs. This is a very important point and often the secret of a sturdy trunk and apparent age.

General care of the plants in the ground is relatively easy. Besides the usual care given any garden plant, fertilizing is done once or twice yearly; in early spring and, perhaps, again in August. I use a diluted, liquid, fish fertilizer. Spraying is done with a multi-purpose insecticide (Isotox) once during the season, after the full leaf growth is out, more if a special infestation occurs.

Watering is much less frequent than for potted trees. In general, once every week or two is enough. During the winter months no special protection or other care is needed nor is it necessary to apply any water.

Eventually, of course, the trees are transferred to pots. This moment of graduation occurs sometime during the winter and early spring when the trees are taken out of the ground for training. It then becomes obvious which have reached the stage of development where they will do best in pots. In my plantings about 6 to 10 trees a year are ready to add to the potted collection. This means they are basically good bonsai but the final refining and dwarfing should now begin. The root, trunk and branch structure are in good proportion but small touches are necessary to give the elegance and character of good bonsai. ♦

*Career opportunity for high school dropouts
in business of garden maintenance*

PRIDE NOURISHES SELF-RELIANCE

Barbara Dubivsky

From the NEW YORK TIMES, July 28, 1968. © The New York Times Co.
Reprinted by permission.

WHEN high school dropouts from Washington's inner city learn the difference between "dirt" and "soil" as worker-trainees with PRIDE Landscaping & Gardening, Inc., they do more than differentiate between grime and earth in which plants grow. They take a first step on the road to economic self-reliance.

"We work with the guys no one else will train, the losers. We teach them everything we know about gardening, and we pay them while they learn," explains Elias Cato, the company's young and energetic general manager.

What more they are doing is providing the Washington metropolitan area with much needed professional gardening and

maintenance services of acknowledged high calibre.

The grassroots effort to develop horticultural skills among the hardcore unemployable is an offshoot of Youth Pride Economic Enterprises, a local, federally funded program designed to create jobs and stimulate self-respect among low-income ghetto dwellers.

With the help of a \$25,000 small business administration loan, PRIDE Landscaping bought out a family firm which had, for some time, been having difficulty hiring enough people to meet all its needs. The previous owner-operators, Theodore Brockman Sr. and his son, Theodore Brockman Jr., were retained as the nucleus of a small staff of experts.



The New York Times by George Tames

Nathaniel McNeil instructs PRIDE members in tree maintenance and use of a saw.

Under the terms of the sale, the Brockmans brought with them several prestigious contracts. PRIDE has acquired additional contracts on its own, including one to tend several hundred acres at the national training school for boys. Other contracts for large properties will be welcomed.

Attracted by the good wages (\$2 an hour for beginners), many applicants come to PRIDE without any marketable skills, but that's no drawback. "What we look for in a guy," Mr. Cato says, "is the desire to work. Since most of the people come from our parent organization we have a pretty good idea of their work performance. Of course, we prefer people interested in landscaping, but when they first come here they don't know what

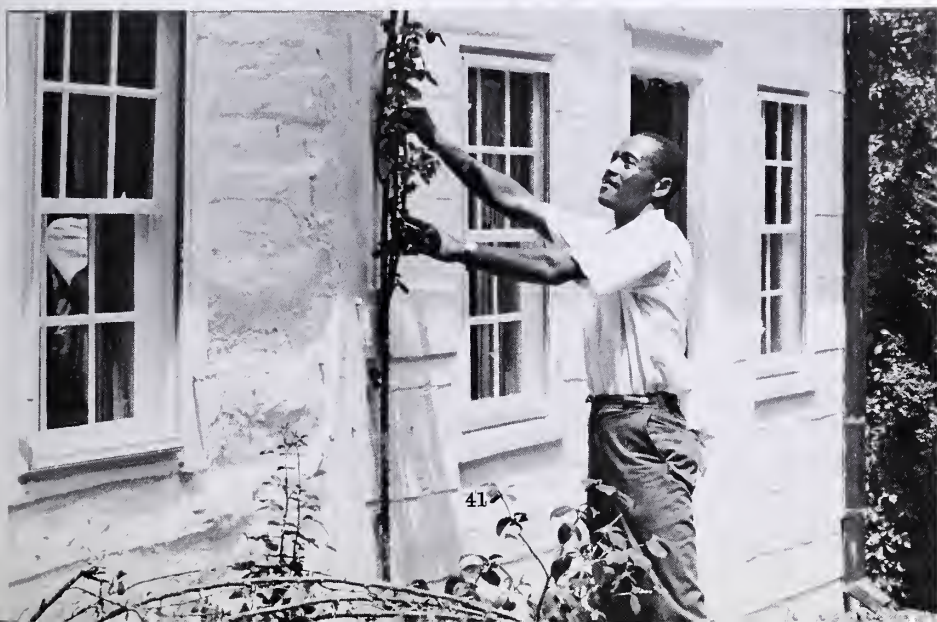
they'd like, except a good job."

Something that involves feel and touch instead of literate understanding has a strong appeal for those without too much schooling. PRIDE, and it is always spelled in capital letters, gives them a sense of belonging to something worthwhile.

With several other important contracts under discussion and old ones being renewed, PRIDE's financial situation looks promising enough for its directors to talk seriously about expansion. They're already considering locations for a sod farm. A nursery of their own, which would provide plant material for their own use and for sale to the general public, is another likely possibility. There is talk, too, of going into the repair of lawn mowers and garden tools. ♦

Right: Many of PRIDE's assignments will be for all-year maintenance of apartment grounds.

Below: On-the-job training includes learning how to prune ornamentals such as this rose.



This moss, valued by the gardener, has a unique and complicated life cycle ...

FACTS ON SPHAGNUM MOSS

William C. Steere

Reprinted from AUDUBON, May-June 1968. Copyright National Audubon Society.

ALL PEAT MOSSES belong to the genus *Sphagnum*, of which perhaps 100 species exist in all the world. In the cooler and wetter parts of the Northern Hemisphere, particularly those regions glaciated during the Ice Age, peat bogs and moors in which sphagnum is the dominant plant cover hundreds of thousands of square miles.

Yet despite its amazing abundance in boreal and Arctic regions, peat mosses are by no means restricted to colder zones. They also flourish in warm temperate climates as well as in the tropics, especially in wet, sandy, acid places, although even when they occur in great abundance they rarely form extensive bogs. In high mountains in the tropics, wet cliffs and rocky mountain slopes may be covered with sphagnum; in the Luquillo Mountains of eastern Puerto Rico, I have found knee-deep mountainside sphagnum bogs.

In the United States, in addition to the great bogs of the North, peat mosses are common in the wetter parts of the sandy coastal plain from Cape Cod to as far south and west as eastern Texas. Northern California and the wetter parts of the Pacific Northwest are rich in sphagnum bogs. Peat mosses do shun the arid reaches of the west-central and southwestern states, as much because of their general alkalinity as their low rainfall.

Despite their great abundance and conspicuous success in dominating the vegetation over vast northern regions, peat mosses in a sense are an evolutionary dead end consisting of the single genus *Sphagnum*. However, they are actually a last remnant of a much larger and more

complex group, whose ancestors and relatives flourished more than 200 million years ago, as we know from fossils of the Permian age.

If we examine a cushion of peat mosses, we find that each vegetative plant of sphagnum may be from a few inches to a yard long, and that the stem tip is tufted with many short branches. The stem is covered in a most characteristic manner with tight clusters of longer leafy branches. The structure of the sphagnum leaf is unique among all plants; although it is only one layer of cells thick, it consists of two kinds of cells which form a beautiful pattern.

One kind of cell is long, narrow, and green; these green cells, of course, are alive and produce all the food needed for the growth and life activities of the whole plant. The green cells are arranged in the form of a network whose mesh surrounds another type of cell which is conspicuously larger, elongated, transparent, dead, and which is particularly well-adapted for water absorption and storage. The outer layers of cells around the stems and branches may also consist of the specialized water-storage type. Because of these large, hollow, absorbent cells, peat mosses can absorb an astonishing amount of moisture, in some species more than twenty times their own dry weight.

Color Characteristics of Peat Moss

When fresh and actively growing in nature, peat mosses are variously and often brightly colored, from clear pale green through many shades of yellow, orange, tan and brown to vivid pink, red and purple. Most species have a characteristic color, which helps to make their



Marjorie J. Dietz

Where sphagnum moss grows: Although outwardly invisible, the low-growing moss is abundant in this eastern Long Island bog. Sedges, cranberry and other plants which need wet, acid soil also thrive here.

recognition easier in the field. When the plants are dried, however, the water-absorbing cells fill with air, the colors fade, and so the dry, baled peat moss, so widely used by gardeners and nursery-men, becomes white or gray, or sometimes a dead-leaf brown.

The beautiful colors and patterns of color where different species grow together can be seen only by visiting a peat bog or moor, and with caution if it is a quaking bog!

The rapid growth and branching of the plants, and the death of older parts below, results in the formation of many new plants by the simplest kind of vegetative reproduction. *Sphagnum* also reproduces by spores in the same general manner as true mosses and hepatics (the liverworts) as well as ferns. The peat moss plant, as we see it growing, is the sexual plant; it produces sperm and eggs in special organs in the tufted stem tips. The sperm must swim through a film of water in order to reach and fertilize the eggs. The fertilized egg divides in an orderly manner to become an embryo spore-producing structure which, in turn, develops into an almost spherical capsule full of one-celled spores.

At the bottom of this capsule is an enlarged attachment structure, the foot, which serves to anchor the capsule to the tip of the vegetative plant as well as to absorb water and nutrients from it. As the capsule ripens, it gradually loses its original bright green color and turns glossy chestnut-brown to almost black, and a relatively large lid becomes visible. As the lid becomes obvious and the capsule wall darkens, the spores inside the capsule develop and ripen.

Because the wall is waxy and impervious to gases, air pressure builds up inside the capsule on a hot summer day to an extent sufficient to blow off the lid with an audible *pop*, like the popping of corn, but on a miniature scale. By holding a match near the buttonlike capsules, or by placing plants with many ripe spherical capsules under a hot lamp, they can be induced to explode under more controlled conditions.

As the air under pressure blows off the lid, it rushes out of the capsule carrying the spores with it. One can actually see a puff of color as thousands of microscopic brown or yellow spores are shot out into the atmosphere. This amazing mechanism for spore dissemination is as practical and effective as it is fascinating; the discharge of spores triggered by the heat of the sun insures that spores are not released on a cold, rainy day, when they would only be beaten down.

Explosive discharge of spores also insures that they will be projected some distance above the bog surface and thus get into air currents and wind eddies that will carry them for great distances. This mechanism undoubtedly explains the extraordinary abundance and wide geographic distribution of the genus *Sphagnum* over the surface of the globe. Now the capsules become cylindrical instead of spherical, so that one can tell at a glance whether or not a capsule still contains its stock of spores.

Surprisingly, the production of capsules or "fruiting" by peat mosses is rarely observed by naturalists, yet it is far commoner than realized even by many specialists. In almost any peat bog during the summer months, one or more species of *Sphagnum* will be found bearing capsules in some stage of development, from young and green to brown and empty.

Naturally, the most interesting stage is when the capsules are glossy, spheroidal, dark brown and with an obvious lid, because one can then induce, observe and actually hear the explosive discharge of spores. The spores drift with the breezes in a wholly passive manner, just as pollen grains are borne. Spores that finally land in an environment suitable to their requirements will germinate and eventually produce the leafy vegetative plant so characteristic of peat mosses. Spores that fall by accident in an unfavorable habitat will perish—undoubtedly the fate of most.

However, if all the billions of spores released in any one year were able to fulfill their reproductive function, the world might be covered with nothing but sphagnum! ♦

*Plants are taking on the job of air pollution
detectives in smog-ridden communities*

AIR POLLUTION DETECTIVES

Charles R. Berry and Howard E. Heggstad

Reprinted from *Science for Better Living*, U.S.D.A. YEARBOOK OF AGRICULTURE, 1968.

AIR POLLUTION injury to plants generally becomes evident before visible effects can be noted on animals, or on such materials as paint, cloth or metal. So plants make good detectives. Injury to a plant is frequently a more convincing indication of injurious pollution than a mark on an instrument chart.

Man has made use of this sensitivity of plants by utilizing them for recognizing the presence of air-borne contaminants, and determining their distribution; also for estimating the level of pollution and providing a passive system for collecting pollutants for later chemical analyses.

Plants often show a specific response to different air pollutants. For example, tulips, gladiolus and corn show a distinct marginal scorch of the leaves after exposure to minute quantities of fluorides, which are by-products of aluminum and ceramics industries and fertilizer factories.

Alfalfa, dandelions and cotton are sensitive to leaf injury by sulfur dioxide, which causes a characteristic scorching in the areas between the veins. Sulfur dioxide arises from smelters and electric power plants, or other sources where coal or oil are burned.

Ozone, a very active form of oxygen, causes small flecks on the upper surfaces of leaves of such plants as tobacco, spinach and beans. This pollutant is produced primarily when sunlight acts upon certain chemical products of combustion of coal or petroleum fuels, especially automobile exhaust gases. Another pollutant, peroxyacetyl nitrate (PAN), is also produced when sunlight shines through various exhaust gases; it causes a silvering or bronzing of the lower surfaces of

leaves younger than those affected by ozone. Frequently, a banding pattern occurs. Plants particularly sensitive to PAN are petunia, lettuce, beans and annual bluegrass.

Ethylene is now a problem in urban areas because it is one of many products of automobile exhaust. Ethylene interferes with plant growth hormones, resulting in growth retardation, flower drop, and abnormal growth such as downward curvature of shoots and leaves. Plants sensitive to this pollutant are tomatoes, orchids, carnations, snapdragons and cotton.

Death of many eastern white pines in the forests of Tennessee stimulated studies of air pollution effects on forests by the U.S. Forest Service in the late 1950's. After fungus, bacterial, and insect causes were eliminated, preliminary experiments suggested air pollutants. Finally, by using susceptible white pines as "detectives," air pollution was definitely shown to be the cause. Spotted needles, yellow needles, or needles with dead tips are the most common symptoms of pollution damage.

Because white pine is unusually sensitive to several known pollutants, work is now under way to determine whether individual white pine seedlings with the proper genetic constitution can be found for use in a wider range of detection problems. Sensitivity of white pine to some gaseous pollutants has already been established. The concentration of ozone that causes injury to this tree is about the same as that needed to injure some annual plants like tobacco or bean. Recent work has shown that some white pines are very sensitive to sulfur dioxide. Sickly

white pines are frequently found along highways, presumably injured by vehicle exhausts. Thus, it is likely that pines grown as evergreen ornamentals could also serve as air pollution detectives.

There are several other examples of the use of plant detectives. Extensive use was made of annual bluegrass in Los Angeles County during the 1950's to monitor oxidant smog. Ozone-sensitive tobacco led to the identification of plant-injurious levels of this pollutant in the eastern United States. Injury to the lower surface of

leaves of petunia and romaine lettuce led to the identification of PAN-type pollutants in California. Cattleya orchids have been used to determine high levels of ethylene in urban areas.

Research continues to further exploit the use of plants to detect air pollutants. In the meantime, the Forest Service, the Agricultural Research Service, the Public Health Service and many state and private institutions are making much use of plants to determine the presence of air pollutants. ♦

Air Pollution Affects Parks, Home Gardens, Agriculture

An excerpt from *THE CONSERVATIONIST* (New York), Dec.-Jan. 1968-69

AIR POLLUTION places restrictions on the types of vegetation that may be raised in the country. In the metropolitan areas of California photochemical smog has made it impossible to raise orchids and the growers have had to relocate in remote rural areas. In the Garden State of New Jersey, pollution injury to vegetation has been observed in every county and damage has been reported to at least 36 commercial crops, including spinach, endive, romaine, table beets and chicory. In central and southern Florida, orange trees have been severely damaged. Indeed, virtually every urban area in the nation experiences damage to vegetation from air pollution and many rural areas that once were thought to be removed from pollution are now experiencing crop injury.

A large number of park department superintendents have reported that they are becoming extremely limited in what they can grow. In addition, plant lovers and gardeners are becoming aware that they must often limit the types of plants they wish to cultivate to those that are less susceptible to polluted air. With increasing frequency gardeners are experiencing damage and destruction to such common and desirable ornamentals as petunia, snapdragon, chrysanthemum, larkspur, carnation, orchid, pansy, rose and zinnia.

It is important to realize that the concentration of pollutants in the air, especially sulphur, need not be excessively high to cause injury to plants. In fact, levels routinely observed in some of our cities can cause severe damage by the action of sulphur oxides. Generally, the plants most sensitive to sulphur are: alfalfa, the grains, squash, cotton, grapes, white pine, apple, endive and those plants with leaves having high physiological activity.

Acute exposure to sulphur pollution will cause broad-leaved plants to dry out, bleach to a light tan or ivory color or even die. Damage to grasses is similar; however, the pattern is more a streaking along the blade, and frequently, the tip is killed.—Stanley Zimring

Brooklyn Botanic Garden researchers seek the cause of

A STRANGE NEW LILAC MALADY

Craig R. Hibben

LILACS AT the Brooklyn Botanic Garden have shown a peculiar type of leaf damage during the past six years. It appears to be a new problem, one that has not been described before. By mid-summer the leaves roll and have dead areas around the edges and between the veins. Often the undersides of the leaves have a bronze sheen, and many leaves feel thick and leathery to the touch. So many leaves fall from the branches of some trees that new shoots begin to grow the same summer, within a few weeks. Lilacs of all ages in our collection show this abnormality, but older specimens often appear to be less affected. Younger trees of some varieties remain healthy even though intermingled with others that show the strange malady.

Brooklyn Botanic Garden researchers have been seeking the cause of this new disease. Soil and leaf samples showed that deficiencies or excesses of nutrients essential for good plant growth were not involved. Moreover, the application of fertilizers to the soil and of liquid fertilizers to the leaves had no preventive or curative effect. The new leaves of lilac cuttings were unaffected when grown in soil collected from beneath the sick shrubs.

Microscopic examination and laboratory tests revealed neither fungi nor bacteria which might be considered causes of the abnormality. However, minute eriophyid mites (pear-shaped, four-legged creatures barely visible to the naked eye) were discovered sucking the plant juices from the leaves of some lilacs, thus causing a greyish-silvery discoloration of the leaves.

Lilac roots and the soil around the roots were examined for root-damaging nematodes. Although nematodes were present, their low numbers, plus the ap-

parent healthy root condition, confirmed that these pests were not primarily responsible for this unthrifty condition.

Air Pollution as Cause?

Two observations suggested that the injurious effects of air pollution must be considered. First, certain noxious gases in the air above the city and its surrounding areas are known to affect green plants in varying degrees. Second, the bronze sheen and other markings on the lilac leaves resembled the type of symptoms that air pollutants can cause on plant tissue. Consequently, simple experiments were carried out to determine whether or not the environmental air was causal: Cuttings removed from diseased lilacs and grown in a pollution-free environment away from the Botanic Garden developed only healthy leaves. When these same plants were returned to the site from which they originated, they again became damaged.

In addition, lilacs grown at the Botanic Garden for more than three months in a plant growth chamber equipped with a charcoal filter (which excluded most air pollutants) appeared in better condition than comparable lilacs kept in a similar chamber of unfiltered air. Clearly, some gaseous pollutant (s) in the air is causing or at least contributing to the leaf-damage of our lilacs. Ozone, a more reactive form of oxygen, was detected as one of the air contaminants that might be injuring the leaves.

Experiments with Pollutants

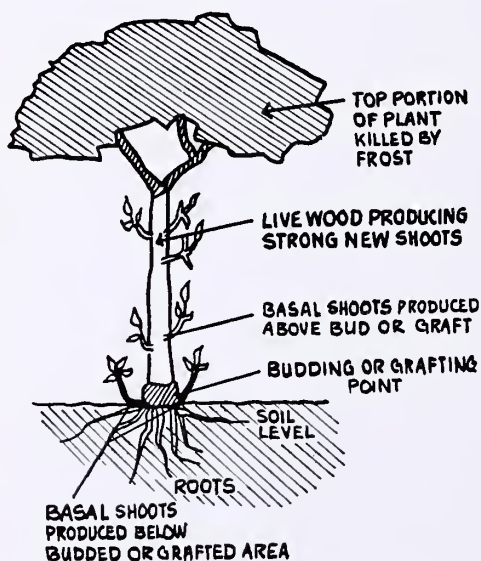
Experiments are in progress to identify the particular gas or combination of gases that may be responsible for the symptoms noted. Lilac plants have been exposed in the laboratory to ozone and to sulfur dioxide, another common pollutant

in the New York City area. So far these plants appear to be fairly resistant under laboratory conditions to the two separate gases. Other smog components have yet to be tested.

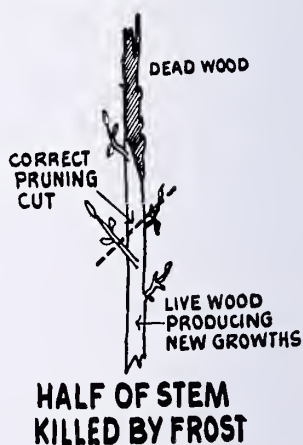
In the meantime, yearly records are being kept on individual lilac varieties at the Botanic Garden so that future recommendations can be made as to which

varieties are most and least sensitive to this malady.

Why are leaves of lilacs and not those of other plants sensitive to pollutants? Why are certain lilacs resistant? Answers to these fundamental questions should go a long way in determining what can be done to protect plants from damaging pollutants. ♦



WHERE TO PRUNE



How to Prune Winter-killed Shrubs

IF TOP of the plant or branch tips only are affected, cut back into living wood (as shown at right,) pruning as heavily as necessary to maintain symmetry. If dieback extends to near ground level, shoots arising from under stock of grafted plants should be removed. Retain only 3 basal shoots of those emerging above the graft.—*Rhodesia Herald*, September 28, 1968.

*An appeal to town fathers, garden clubs,
and civic and service organizations . . .*

A PROPOSAL FOR COMMUNITY COMPOSTING

Ira Caplan

From the NEW YORK TIMES, April 21, 1968. © The New York Times Co.
Reprinted by permission.

AS HOMEOWNERS clean up their gardens this spring, they will soon find out where all the dead leaves of last fall went. Debris is cluttered behind shrubbery, over the flower border, thick in the thickets and elsewhere. The annual leaf fall and what to do with it is getting to be a serious question in New York State. It is against the law to burn leaves if the town has a population of 30,000 or more.

Last year, the state's Air Pollution Control Board instituted a ruling that makes open burning of refuse of any kind illegal.

The homeowner can compost his leaves, grass clippings and garden debris if—and this is a big if—he has the space for it, the knowledge to manage compost properly and the time and will to do it. For compost is like the weather. Every gardener talks about its value, but few build a heap. In fact, most homeowners—particularly those who live on small suburban lots—consider a compost heap obtrusive and undesirable. Yet the annual crop of leaves has to be disposed of.

What is the answer? The municipal compost heap may be the only realistic approach. Compost from a municipal compost pile can be used by public agencies—parks, shade tree committees, highway departments, school athletic fields and the like. And the excess can be sold or given away free to homeowners for their own gardening use.

The biggest expense—other than the land for the facility, and a couple of acres should be ample—is the hauling. The closer the facility is to the greatest

number of users, the lower the cost ought to be. This would indicate that a town or village facility would probably be more efficient in cost than, say, a county facility. Experience has shown that the closer the compost is to the homeowner—or the shorter the distance he has to haul it—the more of it he will buy and use.

Alternatives

How would such a facility operate? Two ways are feasible. A municipal agency—Highway Department, Park Department or Shade Tree Commission can handle the entire operation—picking up leaves at curbside with a vacuum-sweeper attachment on a truck and taking them to the composting site where they would be shredded and piled into heaps. The only equipment necessary would be shredders, a forked bucket loader to turn the piles and possibly a bagger for packaging compost for sale to homeowners.

The other way some communities are handling the job is to have the pickup done by the highway department and then contract the rest of the operation to an individual or company. This has some additional advantages beyond a possible lower cost of operation to the municipality. If this contractor is a poultry farmer, or a dairy farmer, or operates a riding stable, he can solve his own waste disposal problem by adding the manures to the compost. This not only will speed up the composting process but will produce a compost considerably richer in nutrients.

Many communities in the United States and Europe are not only composting their

leaves, but their garbage and sewage sludge as well. Specially constructed plants turn out finished, sterile compost in 24 hours. One of the best-known brands of organic soil additives on the commercial market has been produced for many years by the city of Milwaukee from sewage sludge.

Cost Sharing

A town or village compost facility can be made even more useful by adding more space and equipment. Add a chipper, power saw and splitter, and the brush and logs delivered by arborists, public utilities and land developers can be quickly converted into wood-chip mulch and fireplace logs. These organizations could be charged a fee for dumping their debris—just as most municipalities charge a

fee to garbage contractors who utilize the town dump or incinerator. In this way part of the cost of operation need not be shouldered by the taxpayer.

The whole question of municipal or community composting needs to be looked at closely—not just by town fathers, but by garden clubs, civic groups and service organizations. It presents the opportunity of benefiting communities, instead of further polluting them with smoke and debris. There is ample literature on the subject—including one specialized publication devoted to the engineering and economics of large-scale compost operations. It is "The Compost Pile," Cornell University Bulletin 991, and is available from the Cooperative Extension Association, 151 South Main Street, New City, N.Y. 10956. ♦

Golden Nematodes Research Development

THE MICROSCOPIC WORMS that bring disaster to many ornamental and economically important plants were in the news recently when the golden nematode was found outside the limits of Long Island, New York. It was on Long Island where this serious pest of potatoes was first discovered within the United States in 1941. In 1968 infestations were found in eight fields, comprising some 350 acres, in Steuben County, New York, some 250 miles northwest of Long Island.

Several Brooklyn Botanic Garden researchers, although not directly concerned with the problem of golden nematode of potato, are searching for possible means of nematode control. One lead being investigated is the influence of organic soil additives such as soybean meal, fish meal, peptone and urea. It has been found that these materials, which have a high nitrogen content, reduce the population of the lesion nematode, which parasitizes many plants. The soil additives had no effect on the nematodes in the absence of soil microorganisms; but when these were present, the nematode populations were reduced by as much as 90 per cent within two weeks after the addition of soybean meal to the soil.

Simple nitrogen-containing chemicals such as nitrites and certain ammonium compounds are also effective. This indicates that it is the simpler nitrogen compounds produced by the degradation of the soybean meal by the microorganisms that are directly toxic to the lesion nematodes.

The next step in working out practical methods for nematode control will be greenhouse and field trials with different ornamental plants.—
J. T. Walker

*Bangkok—ancient capital of Thailand
and a city of 1½ million
—is successfully composting its municipal wastes*

HOW BANGKOK HANDLES ITS GARBAGE

Ellen R. McConnell

Condensed from ORGANIC GARDENING AND FARMING, March 1968.

A MODERN COMPOSTING PLANT in Bangkok exists and processes approximately 320 tons of refuse per day, which is one-third of the total collection from the city's metropolitan area. The plant has fulfilled its purpose so successfully that plans are underway for three additional plants just like it.

Refuse collected from the municipality of Bangkok had formerly been deposited on an open dump, with all the resultant ills attending such a practice, including the sifting down of bacteria into the extraordinarily high water table in the vicinity. The Ministry of Health pondered this problem, deciding that composting was the best of the various plans considered. Consequently the plant was planned, built and put into operation about 6 years ago. It has been operating continuously since then, 7 days a week. There is no letup in the trash which a city produces, and that makes composting a double blessing, since the process completes nature's circle. The health hazards, the smells and smoke are gone, as well as the ugliness which, in some open dump areas, spreads over acres and acres. The municipality operates this plant as one of its functions, supported by the government of Thailand.

Mr. Charoen Antarikarnanda, the Deputy Director of the project, holds a degree in electrical engineering. He explained the various steps in the operation as we toured the compound.

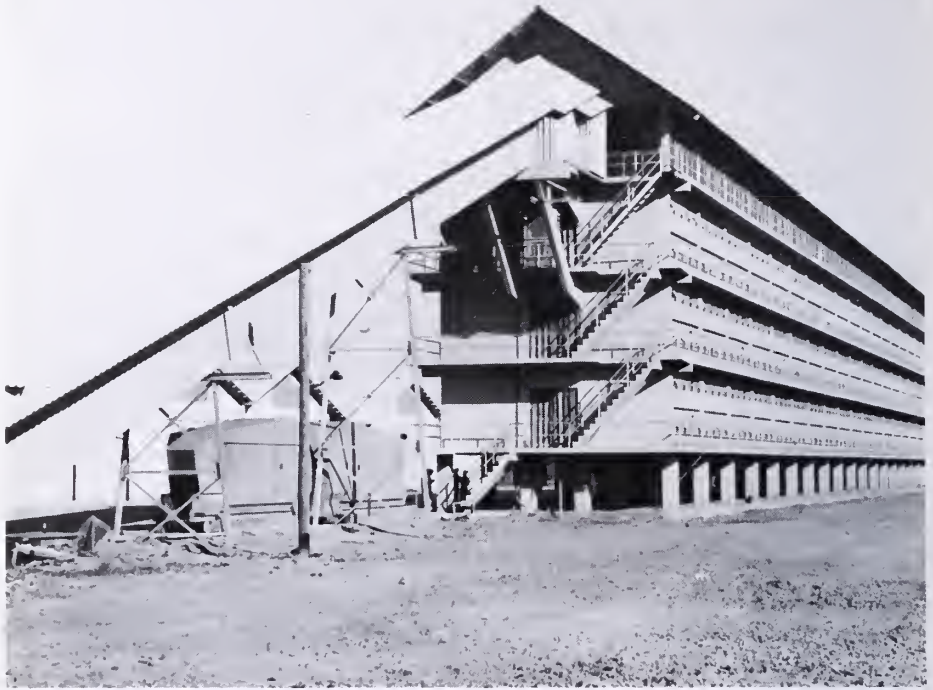
This is a municipal function and not a profit-making organization. Mr. Charoen

stated that the cost for composting one ton of refuse is from \$2.50 to \$3.50, including depreciation and interest costs. This contrasts with a cost of \$1.50 per ton for dumping in an open fill. If an incinerator were used, the expense would be approximately the same as for composting, but installation of incinerators would cost almost twice as much as the machinery and buildings for the composting process. Even though the sale of compost brings in a return of only one-fifth the total cost, isn't composting the most logical and helpful way to handle the waste from a large city? Ashes from an incinerator must be transported and dumped, with further expense and land-use problems resulting.

The Bangkok compost, which has been digested and is spread out in the sun, may be hauled away for a pittance. Any farmer may bring his own truck and buy a load for the equivalent of 25 cents. Eventually, however, the bulk of the output is bagged and sold. The flower-market stalls and many other places sell a small, easily-handled two-pound bag, as well as a 10-pound size selling for about 12 cents.

Many different mixtures are made from the municipal compost, which are then bagged and sold under various numbers.

It is a fact—one I must report in all honesty—that the compost is not utilized as much as it should or could be by the farmers who need it for their land. Extensive experiments have now been conducted by various divisions of the Ministry of Agriculture. Some testing has also



BICC

This fermentation plant in Bangkok handles 320 tons of refuse daily. Three more will be built. Similar plants also exist in Taiwan, Manila and New Zealand.

been carried out by students of Kasetsart University in their routine classwork. Each student in this agricultural college maintains his own garden, which has made an excellent opportunity for experimentation.

All the tests—both with the rice farmers and the students, as well as orchardists—have shown that the compost is of great value to the soil and, where it has been used, has raised the yield of the crops. These experiments have been carried on over a period of 4 years and have shown conclusive results. Mr. Charoen states that by improving the organic content of the soil, it would be possible to raise two rice crops a year in many cases.

One problem which interferes with greater use of the compost on small farms

is that most of the farmers do not own their land. We all know that a tenant farmer is not going to take very much of his own time and money to improve the land. And what of the owners? We also know that they are primarily interested in getting their rent. Therein lies the problem. At any rate, this compost plant may prove over the years to be the most economical solution to refuse disposal, and provide a worthy example for other municipalities. There are plants also in Taiwan, Manila and Auckland, New Zealand.

How wonderful it would be if many of our U.S. cities would start a new regime of municipal composting, realizing that this could be the answer to some of our problems! ♦

Roots are fundamental but often forgotten as factors in growth

THE IMPORTANCE OF A PLANT'S ROOT SYSTEM

Donald F. Scheer

Condensed from FLORIST & NURSERY EXCHANGE, April 9, 1968.

ROOTS, like people, need nutrients and water for growth and survival, but—as with many people regarding their own health—the lowly root in most cases is the forgotten part of the plant.

Very often the basic difference between a successful, high-yielding flower or nursery crop or an expensive failure can depend on correct root growth and proper function. High yields require root systems which effectively utilize soil fertility and moisture.

By growing through the soil, roots gather necessary water and nutrients. The mature root systems of plants have millions of root tips, each tip progressing through the soil and absorbing most of the water in the smaller spaces between the soil particles with which they come in contact. Large amounts of water are absorbed in this way. A classic example is the work of H. J. Dittmer who in 1937 discovered that the total length of all the roots on a four-month-old rye plant was more than three miles. Nearly 55 miles of new root hairs were formed per day! This is the situation with many common florist and nursery crops.

Because root hairs (slender extensions of single root surface cells) do the actual underground work of gathering food and water and have a rather short life—only a day or two for most crop plants—every new one must do the nutrient-gathering as quickly and as efficiently as possible. Realizing this, the grower must do all he can to encourage good root-hair growth. This calls for proper, regular attention to nutrition, watering and temperature.

The following list is suggested as a guide for better root growth:

1. If sandy soil is the main problem, improve the water-holding capacity and nutrient retention or buffering (and drainage). Add organic matter such as manure or sphagnum peat moss.

2. If soil is heavy, open it up for better drainage and aeration by digging in or rototilling in such materials as peat moss, peanut hulls, straw, perlite, haydite, calcine clay and coarse sand (at least 30 per cent).

3. Make sure greenhouse benches are deep enough (about 10 inches) for good drainage, especially when the soil is tight.

4. Put as few stones as possible in the bottom of pots. Stones make the soil column shorter, resulting in wetter soil.

5. Be certain the drainage holes in the bottom of pots and benches are free.

6. Turn over bench soils by hand about once every two years. Rototillers develop a hardpan at the bottom of the area they reach, and can cause trouble.

7. Before planting each crop, have the soil tested. Add limestone, sulphur and superphosphate as needed. (These materials are not very soluble, and later distribution can be a problem.)

8. Always plant close to the surface to encourage rapid root growth.

9. Never let a plant grow too long in any one pot. As the plant grows and expands, switch it from its smaller container to a larger one. Root prune, as necessary, to prevent root circling.

10. With container plants kept outside in cold areas, be sure to place the containers closely together so that they protect each other and will help reduce temperature fluctuations. Mulch over the top and along the sides of the containers. ♦

"These name changes all depend on scientific investigation, and it is no use grumbling about them"

THE CHANGING NAMES OF PLANTS

Harold William Rickett

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GARDEN JOURNAL/Jan.-Feb. by permission.

THE names of many well-known plants have often changed, to the dismay of horticulturists, agriculturists, foresters, and even botanists. The changes have been made by professional plant taxonomists, who have accordingly been variously accused of not knowing their own minds, of a wanton desire to confuse others and maintain their own sacred mystery, of wishing to see their own names attached to names of plants, and of other discreditable motives. There is, regrettably, a modicum of truth in these accusations. We all know botanists whose scientific judgment is clouded by their desire to see their names in print. However, as our science advances, the number of such persons is noticeably becoming yearly smaller.

Changes in names are, unfortunately, inevitable and necessary. They have been made with good reason in the past, and will be made in the future. They have two quite different causes: nomenclature and taxonomy. The distinction is not always understood by onlookers at science; sometimes not by scientists themselves.

Carl Linnaeus of Uppsala was the father of botanical nomenclature. To be sure, he owed his debt to many fine botanists who came before him. But officially we begin our naming of plants in 1753 with the publication of his book *Species Plantarum*, the species of plants. Here for the first time all known species (about 6000) were given binomials—two-part names, as *Lilium canadense* and *Rosa gallica*—accompanied by brief identifying descriptions. With this work we associate the fifth edition of his *Genera Plantarum*, published in the following

year, in which the genera were characterized.

Taxonomy

Linnaeus also *classified* the genera and species; that is, he placed them in classes according to selected characteristics. His criteria are very far from those we use today; he cannot be called the father of botanical classification, though his scheme provided a facile means of identification and was popular for more than a century. It grouped species according to the number (and other characteristics) of the stamens in each flower: the classes were *Monandria*, "one stamen," *Diandria*, "two stamens," and so on. The classes were subdivided according to the number of styles in each flower.

Even in Linnaeus' lifetime many derided a system that brought into one class such unlikely bedfellows as a grass, an iris, and a valerian, and on the other hand split the mints and their relatives into two different classes. Linnaeus himself recognized the artificial nature of his system and made a beginning on a "natural" system, one based on *all* the characteristics of species rather than just one or two. He noticed several families (as we now call them), as the bean family, the cucumber family, the parsley family, and others. These efforts were shared and carried forward by many other botanists.

Since the middle of the nineteenth century, with the publication of Charles Darwin's great work *The Origin of Species by Natural Selection* (1859), those who classify plants have realized that a "natural" system is one that is based on the "natural" relationships of species:

that is, the descent of several species from the same ancestor by evolution. To coax all known species and genera into such a system is the aim of most modern taxonomists. The chief hindrance to that aim is that we do not *know* the ancestors; they no longer exist. We have to *infer* them through all sorts of studies—studies of fossils, of anatomy, of genetics, of how plants change today and of what parts do not change; all these investigations constitute the science of taxonomy, which means, literally, the laws of classification.

New knowledge sometimes illuminates the more murky corners of the plant kingdom; sometimes it changes our established ideas. Only recently, for instance, was it shown, by anatomical study, that the peonies, genus *Paeonia*, long placed in the buttercup family, were not at all closely related to the buttercups and their relatives; they now form a family of their own. On the other hand, study of plants from many parts of the world has made it clear that the lobelia and bluebell families should be united. Different as are the lobelias and bluebells of the eastern United States, when one knows all their relatives it is apparent that there is no cleavage between the two groups of sufficient weight to make two families of them.

Such revision of the nature and extent of plant families is constantly being made, and occasions little or no trouble to those who use plant names. Whether the cardinal-flower is a member of this or that family does not disturb the name by which we know the species, *Lobelia cardinalis*. The trouble begins when scientific study shows that a species is in the wrong genus, or has been wrongly identified with another species.

Increased acquaintance with hundreds of species of rhododendron and azalea has shown that they cannot be separated; all belong in one genus, *Rhododendron*; our common native azalea, for instance, is *Rhododendron nudiflorum*. A tall and handsome plant of roadside thickets, crowned with one or more spires of minute white flowers, was long known as

Veronica virginica; when its individual characteristics are taken into account it becomes *Veronicastrum virginicum*. The common little woodland weed called jumpweed, known to me and many others as *Polygonum virginianum*, has been shown to be sufficiently distinct from the smartweeds to be placed in a separate genus; its name is *Tovara virginiana*. The plant I once knew as *Arabis virginica* puzzled me by being in many ways as much like the bitter cresses, *Cardamine*, as the rock cresses, *Arabis*; it is now *Sibara virginica*.

Our common black-berried nightshade has been generally thought to be the same as the European *Solanum nigrum*. It has recently been shown to be a distinct (though closely related) species, *S. americanum*. Common yarrow was likewise considered identical with *Achillea millefolium* of Europe. Detailed study of chromosomes—those microscopic autocrats of development—has shown most of our plants to be *A. lanulosa*. *Achillea millefolium* does occur in America but is apparently uncommon. One of our most beautiful native orchids was named *Limodorum tuberosum* by Linnaeus. It proved impracticable to keep the species in *Limodorum*, and an American student of orchids decided, for some reason, that Linnaeus' description did not apply to our plants, for which the American adopted the later name *Calopogon pulchellus*. But recent study has shown that Linnaeus did indeed refer to the American species, which must accordingly be called *Calopogon tuberosus*.

These name changes all depend on scientific investigation, and it is no use grumbling about them. The investigation is sound and one cannot prohibit it or its conclusions, any more than one can prohibit investigation into the composition of the stars or the causes of cancer. To a certain extent the *naming* of the plants whose status is thus revised is a matter of judgment. Some botanists, for instance, prefer to call our yarrow *Achillea millefolium* subspecies *lanulosum*. But, unless one is careful always to use the awkward three-barreled name, one may be con-

cealing good scientific distinctions! Judgment must be used, indeed. A well-known botanist split the genus *Astragalus*, the milk-vetches, into twenty-eight genera; subsequent research has denied the reality of such a swarm of distinct genera, and this also is due to the advance of science.

Nomenclature

Turning now to the other cause of name changes—nomenclature, the strict application of agreed rules of nomenclature—we recognize two main principles (and many subsidiary ones that we need not elaborate here): priority and the type method.

Priority means that if a species or genus or family accidentally gets more than one name, the earliest since 1753 is the correct one, providing certain technical requirements are met. For instance, the rhododendron long known as *Rhododendron carolinianum*, so named by Alfred Rehder in 1904, was shown to be the same as the *Rhododendron minus* named by André Michaux a century before; the earlier name must be used. The wild bean named *Apios tuberosa* by Conrad Moench in 1794 (its small tubers were used as food by the Indians and by colonists) had already in 1788 been named *Apios americana* by Friedrich Kasimir Medikus; and this name is therefore the correct one. It is unfortunate that industrious botanists dig up obscure publications which contain earlier names. But they can't be stopped!

The type method in nomenclature associates the name of a genus with one of its species, or the name of a species with a definite preserved specimen. It does not mean that the "type" so designated is the most "typical" species or specimen, but only that the name is forever wedded to it. *Dracocephalum*, named by Linnaeus, was found by later botanists to include species in quite different genera. Some of these are common wild flowers of North

America, often found cultivated in gardens: sometimes called obedient-plants. Others—the great majority—are Asian plants. To which group should we apply the name? We decide by selecting one species as the type. If we choose one of the common American obedient-plants, calling it *Dracocephalum virginianum*, then a large number of Asian plants are left without a name. If we choose one of the group that includes the Asian plants, they keep their names, and so does the American group, which has already been named *Physostegia*: *P. virginiana* has long been the name of a common American species. So by choosing the type we avoid excessive name changing—though doubtless upsetting a few persons addicted to the alternative choice.

Change for Galax

A well-known plant of the southeastern mountains has long been known as *Galax aphylla*, a name given to some plant by Linnaeus. Careful study of Linnaeus' description has shown that it refers to an entirely different plant. Ours consequently takes the name given to it by Frederick Pursh, *Galax rotundifolia*. This species becomes, by legislative action, the type of the genus *Galax*.

But why should we have rules of nomenclature, if all they accomplish is to change names and confuse people? There is some point to the question—but without rules things would be much worse. They were in 1866, when all the plant growers, as well as botanists, were using different names for the same species until no one knew what any other person was talking about. That was when botanists, assembled in London, asked Alphonse de Candolle to draw up a set of rules for nomenclature. His proposals, modified and expanded by succeeding congresses, are the basis of the current *International Code of Botanical Nomenclature*.*

(Continued)

* *International Code of Botanical Nomenclature*, Adopted by the Tenth International Botanical Congress, Edinburgh, August 1964. Published by the International Bureau for Plant Taxonomy and Nomenclature of the International Association for Plant Taxonomy, 1966.



Marjorie J. Dietz

RHODODENDRONS OR AZALEAS?

All three shrubs are in *Rhododendron* genus, but plants below are commonly called azalea, once considered a separate genus. Plant above is *R. minus* (formerly *R. carolinianum*); below, left, a large-flowered Exbury azalea; right, a Glendale evergreen azalea.



The various and often complex provisions of the Code cannot be here reviewed. But the two main principles, priority and the type method, are plain enough, and are responsible for many of the name changes deplored by horticulturists, foresters, and others who must use plant names. There have been efforts to enforce a *status quo* by outlawing the works of certain authors, or by establishing a list of commonly used names to be maintained in spite of the rules. The latter has actually been done, for the names of many genera. The genus *Galax* mentioned above is thus saved, in place of an earlier but unfamiliar name. But to extend this to the names of species would entail an amount of clerical work and research that dismays botanists and is not realized by others. However, there is in process an effort to save by a similar

legislative "conservation" a list of selected plants of outstanding economic importance.

I hope it will afford some consolation to the many persons who object to the practices of taxonomists to understand, first, that classification is a science, not an artificial system, and that as such it cannot be prohibited even if it means changing the names of plants. Second, that though strict application of the International Code does indeed result in the changing of familiar names, the situation was once much worse and the use of the Code does tend towards stability of names. And finally, that scarcely any of the changes in names made today are irresponsible, arbitrary, or capricious; they are soundly based either in the science of taxonomy or in the laws of nomenclature. ♦



Louis Buhle



TWO YEARS AGO a staff member admired an unusual tree in a nursery garden in Hong Kong. His Chinese host, who gave him two cuttings from it to take back to the Brooklyn Botanic Garden, could supply no details other than that it belonged to the genus *Podocarpus*.

The cuttings, duly fumigated, rooted and flourished in the greenhouse. Its true identity remained a puzzle. Although it was quite different from any *Podocarpus* species we knew, it was almost surely a member of the cone-bearing plants popularly called "conifers." None of the reference books on gymnosperms in the Brooklyn Botanic Garden Library showed any illustrations of such a plant. Later, a sketch was discovered in a three-volume reference on Chinese plants with text in Chinese. Fortunately, these books did give some details on plants in English and some fitted our plant. The search for the plant's complete identity ended in a German-language reference book which showed both an illustration and description. It proved to be *Podocarpus imbricatus*. It is a native of Malaya, Vietnam, China, Burma, Java, New Guinea and the Philippines where it is reputed to be an important timber tree.—George Kalmbacher

RECENT BOOKS WORTH NOTING

Easy Gardening with Drought-resistant Plants by Arno and Irene Nehrling. Hearthside Press, Inc., New York. 320 pages, illustrations and photographs. \$6.95

The authors survey an impressive list of drought-resistant plants for all regions and climates. They also include suggestions for specific gardening methods to conserve water.

The Common Sense Guide to Growing Roses by John J. Simpkins. Funk & Wagnalls, New York. Photographs by the author. \$4.95

Here is a non-technical book for the beginning rose grower. Large, page-size (about 8½ by 5¼ inches) photographs show just about everything one needs to know about planting and growing roses.

A Field Guide to Wildflowers of Northeastern and North-central North America by Roger Tory Peterson and Margaret McKenny. Houghton Mifflin Company, Boston, Mass. 420 pages, illustrations in color and black and white by Mr. Peterson. \$4.95

This is the latest addition to the Peterson Field Guide Series. The presentation is described as "a visual approach" and the flowers are arranged by color, form and detail. The illustrations, especially those in color, are excellent.

Wildflowers in Your House by Josephine von Miklos. Doubleday and Company, Garden City, N.Y. 176 pages, 227 black-and-white and 8 color photographs by the author. \$8.95

Here is a different idea in flower arrangement books, which should appeal to anyone who loves to look at flowers in unstudied arrangements and simple containers.

Gardening from the Ground Up by Stanley Schuler. The Macmillan Company, New York. 308 pages, illustrated. \$7.95

This is a beginner's guide to planning the home property and its subsequent maintenance.

Wildflowers of Cape Cod by Harold R. Hinds and Wilfred A. Hathaway.

Chatham Press, Chatham, Mass. Illustrated with photographs and pen-and-ink drawings. \$5.95

The newly created Cape Cod National Park is the inspiration for this book which was produced with the cooperation of the National Park Service. While it specifically treats the plants of bogs, pond areas, seashore, salt marshes and open woodlands found on Cape Cod, the book will be as useful for similar situations found throughout northeastern New England.

Pioneering with Wildflowers by Senator George D. Aiken. Prentice-Hall, Inc., Englewood Cliffs, N.J. 208 pages, illustrated with black-and-white and color photographs by Charles Johnson. \$7.95

Senator Aiken's book was first published in 1933 and has since remained a bible for those more interested in growing wildflowers than in merely identifying them. There is a new preface by Senator Aiken. The photographs are an attractive addition.

You Can Grow Cattleya Orchids by Mary Noble. Mary Noble, Jacksonville, Fla. Photographs in black and white and color. \$3.50

A well-written and well-illustrated guide on growing orchids.

Bamboos—A Gardener's Guide to Their Cultivation in Temperate Climates by Alexander High Lawson. Taplinger Publishing Company, New York. Illustrated with drawings and photographs. \$12.00

There are several kinds of hardy bamboos suitable for special ornamental effects in the home landscape. The author, who is British, approaches the subject in a scholarly, thorough manner.

Songbirds in Your Garden by John K. Terres. Thomas Y. Crowell Company, New York. Introduction by Edwin Way Teale. Illustrated by Matthew Kalmenoff. \$6.95

A new, expanded edition of a standard favorite.

Table Decoration: Yesterday, Today and Tomorrow by Georgiana Reynolds

Smith. Charles E. Tuttle Company, Rutland, Vermont. 288 pages, illustrated. \$15.00

This is a carefully researched, yet always attractive history of table arrangements and suitable containers.

How To Prune Almost Everything by John Philip Baumgardt. M. Barrows & Company, New York, Illustrated. \$5.95

Even the most experienced gardener will be helped by this guide. The author supplies sensible, understandable instructions for pruning just about every familiar garden tree or shrub.

Fruits for the Home Garden by Ken and Pat Kraft. William Morrow and Company, New York. 287 pages, many photographs in color. \$6.95

Here is sound advice and information for the home owner who wants a handful, or a bushel, of fruit from his own place. The Krafts have grown most of the fruits they write about, lending authenticity to their recommendations—all given in a chatty, informal style.

The Gardens of Winterthur in all Seasons by Harold Bruce. Foreword by Henry Francis du Pont. A history of the gardens by C. Gordon Tyrrell. 196 pages, photographs by Gottlieb and Hilda Hampfler. \$12.95

Although size (about 11¼ by 8¾ inches) and price tend to place this handsome book in the cocktail-table category, it is neither too heavy to comfortably handle and read nor overpriced for its content. Winterthur is especially known for its azaleas and rhododendrons, and both the text and superb photographs of the Hampflers, which are reproduced in faultless gravure and color, point up this specialization. Many other plants are featured, too, and as the book is arranged according to seasons, beginning with winter and ending with autumn, there is opportunity for wide plant diversity.

Rock Gardening by H. Lincoln Foster. Houghton Mifflin Company, Boston, Mass. 466 pages, illustrated with drawings by Laura Louise Foster. \$7

When an experienced practitioner of the art of rock gardening writes on the

subject, the result is a solid, excellent book of the quality of this one. Mrs. Foster's illustrations of alpine plants are beautifully executed.

Gardening on Main Street by Buckner Hollingsworth. Rutgers University Press, New Brunswick, N.J. 170 pages, illustrated. \$7.50

Mrs. Hollingsworth is a transplanted gardener—she moved from the New York City vicinity to a small town in Vermont—and this is her story of a new garden created in the very center of town.

House Plants by George Elbert and Edward Hyams. Funk & Wagnalls. 208 pages, photographs in color. \$7.95

A substantial book on house plants, with both an English and American point of view. The information on growing plants under artificial lights should be especially useful.

Rare Orchids Everyone Can Grow by Jack Kramer. Doubleday and Company. 144 pages, color and black-and-white photographs and drawings. \$6.95

Instructions for growing many of the lesser-known orchids are given. Included are some intriguing miniature orchids.

Poisonous Plants of Hawaii by Harry L. Arnold. Charles E. Tuttle Company. 71 pages, illustrated. \$2.50

While the purpose of this book is to call attention to plants with toxic properties, it can well be used as a guide by visitors interested in identifying plants observed on walks.

Oldtime Gardens. A Book of the Sweet of the Year by Alice Morse Earle. Macmillan Company (1901). Reissued by Singing Tree Press, a division of Gale Research Company, Book Tower, Detroit, Mich. 489 pages, illustrations. \$9.50

This garden classic is a pleasure to read even if its information and advice belong to a different time.

The World of the Japanese Gardens from Chinese Origins to Modern Landscape Art by Loraine Kuck. Walker-Weatherhill (Distributed in U.S. by Walker and Company, New York.) 414 pages, photographs in color and black and white. \$17.50

The author's original intent was to revise her earlier book **The Art of the Japanese Gardens**, which was first published in 1941. While the material from the earlier work has been retained, the new book is broader in scope and takes into account the major effect that Japanese gardening has had on modern landscape design. This is a handsome book in all ways—typography, general layout and reproduction of black-and-white and color photographs are superb. The color photography by Takeji Iwamiya is beautiful.

Science for Better Living, The Yearbook of Agriculture, 1968. Superintendent of Documents, Washington, D. C. \$3.00

Uncle Sam's scientists are forever on the alert. An example—controlling the spread of sleeping sickness disease which menaced some areas last year.

Climbing Plants and Some Wall Shrubs by Douglas Bartrum. John Gifford, London. (Distributed by Charles T. Branford Co., Newton Center, Mass.) 204 pages, color and black-and-white photographs. \$5.00

This revised edition, although prepared for English gardeners, has much of interest for gardeners anywhere. The material on training non-climbing shrubs against walls and fences is very informative.

Hardy Ferns by Reginald Kaye. Faber and Faber, London. Photographs in black-and-white and color. \$7.80

Thorough coverage of ferns as garden plants. The photographs are especially handsome.

Roots: Miracles Below by Charles Morrow Wilson. Doubleday and Company. 234 pages, \$5.95

The underground world of plants is described in language anyone can understand.

Plant Propagation: Principles and Practices by Hudson T. Hartmann and Dale E. Kester. Prentice-Hall. Illustrated. \$14.95

A second edition of a basic horticultural textbook.

Flower and Plant Production in the Greenhouse by Kennard S. Nelson. In-

terstate Printers and Publishers, Inc. Danville, Ill. Illustrated. \$6.50

A textbook for commercial growers.

Manual of Wayside Plants of Hawaii by Willis T. Pope. Charles E. Tuttle Company. 289 pages, illustrated. \$6.00

Fairly scholarly treatment for questing visitor, either walking or motoring. It's of interest that very few of these plants are endemic—most have been brought to the Islands from near and far parts of the world.

Fruits of Hawaii by Carey D. Miller, Katherine Bazore, Mary Bartow. University of Hawaii Press. 229 pages, illustrated. \$4.50

An enlarged and revised edition. Descriptions, nutritive values and recipes of such fruits as ocerola, avocado, and tamarind.

Plants of the World. The Higher Plants 2 by H. C. D. de Wit. E. P. Dutton and Company, New York. 175 color photographs. \$17.50

An impressive work, the second volume in a far-reaching series. The color photographs are excellent as is the text.

Weathered Wood with Flowers by Mary C. Knight. William Morrow and Company. Photographs in black-and-white and color. \$6.95

Modern arrangements with wood as the major accessory.

The Art of Judging and Exhibiting Flower Arrangements by Sylvia Hirsch. Thomas R. Crowell. Illustrated. \$4.95

Instruction for beginners at both ends. **Tree Trails in Prospect Park** by George Kalmbacher and M. M. Graff. Greenward Foundation. Paperback. \$1

Suggested strolls in a city park.

How to Grow Roses by J. Horace McFarland and Robert Pyle. Macmillan Company. 176 pages, illustrated. \$4.95

This third edition of a popular book has been revised by George M. Hart and Catherine E. Meikle.

Vegetables for Today's Gardens by R. Milton Carleton, Van Nostrand Company, Inc., Princeton, N.J. 180 pages, line drawings. \$5.95

For those who care more about flavor than market durability.

1001 House Plant Questions Answered by Stanley Schuler. Funk and Wagnalls. A paperback. 278 pages. \$1.50

Convenient help for indoor gardeners.

Indoor Gardens by Ware Budlong. Hawthorn Books, New York. 175 pages, photographs in color and black and white. \$6.95

Mrs. Budlong's book is full of ideas for house plant combinations and miniature gardens indoors.

Trees for Architecture and the Landscape by Robert L. Zion. Reinhold Book Corp., New York. 284 pages, photographs in color and black and white. \$25

A big book full of information and original observations. Rather than avoiding the planting of the threatened American elm, Mr. Zion recommends planting it at every opportunity, suggesting that "it will succumb not to

disease but to disuse".

Discover American Trees by Rutherford Platt. Dodd, Mead and Company, New York. \$4.50

This is a revised edition of **American Trees**. It is crammed with little-known facts about major trees.

Lilies by Jan de Graaff and Edward Hyams. Funk & Wagnalls. 142 pages, photographs in color and black and white. \$6.95

Lilies are discussed from the English and American points of view. The color pages are the rather familiar photographs of Mr. de Graaff's American hybrids.

The Garden Bulbs of Spring by Marc Reynolds and William L. Meachem. Funk & Wagnalls. 237 pages, photographs in color and black and white. \$5.95

All about tulips and other bulbs.

Recent Government Bulletins for Gardeners

One of the more ambitious reports of 1968 to come from the Superintendent of Documents (Government Printing Office, Washington, D. C. 20402) is the two-and-a-half-year study from the President's Council on Recreation and Natural Beauty entitled *From Sea to Shining Sea, a Report on the American Environment—Our National Heritage*. It contains 304 pages and is a bargain at \$2.50 for those who need a complete survey on beautification and environmental improvement and conservation.

Other titles of more direct interest to gardeners from the United States Department of Agriculture include:

Bridge Grafting and Inarching Damaged Fruit Trees (Leaflet No. 508, 5 cents) — Good before-and-after photographs.

Growing Boxwoods (Home and Garden Bulletin No. 120, 10 cents)—Commonsense information on every aspect.

Growing the Flowering Dogwood (Home and Garden Bulletin No. 88, 5 cents)—Helpful on culture as well as pest control.

Growing Flowering Perennials (Home

and Garden Bulletin No. 114, 15 cents) —All about perennials in the garden.

Growing Fruit for Home Use in the Northern Great Plains (Home and Garden Bulletin No. 111, 15 cents)—General information for cold-climate areas. Useful drawings and photographs on planting and pruning.

Growing Magnolias (Home and Garden Bulletin No. 132, 5 cents)—Survey of both native and Asian magnolias. Contains a special hardiness zone map for magnolias.

Home Propagation of Ornamental Trees and Shrubs (Home and Garden Bulletin No. 80, 10 cents)—Covers layers, cuttings and grafts.

Selecting Shrubs for Shady Areas (Home and Garden Bulletin No. 142, 10 cents)—Includes broad-leaved evergreens and deciduous shrubs and their hardiness ratings.

Spring Flowering Bulbs (Home and Garden Bulletin No. 136, 10 cents)—Outdoor culture and forcing for indoors.

(These booklets are all available from The Superintendent of Documents, address above. Do not send stamps.)

WOODSMAN—BURN THAT ELM!

The battle against Dutch elm disease continues in every community in the northeast

George Pellettieri

Condensed from THE CONSERVATIONIST (New York), Oct.-Nov. 1968

THE ELM, particularly the American elm, was a favorite of the early urban tree planters because of its wide-spreading, vase-shaped crown and absence of low limbs. It provided shade with beauty and yet did not block the view at eye height. Now it seems only a matter of time before the grace and shade of the tree will have disappeared from the streets because of the Dutch elm disease.

The actual disease is caused by *Ceratomyces ulmi*. The fungus can enter the tree through root grafts or wounds made by two species of bark beetles. *Scolytus multistriatus*, the lesser European elm bark beetle, is the principal carrier of the fungus. However, *Hylurgopinus rufipes*, the native elm bark beetle, can also transmit the disease. Once inside the tree, the fungus multiplies and produces millions of tiny spores which are spread throughout the tree in the water-conducting vessels of the wood. As the fungus grows, these vessels become plugged, thus causing wilting, death of the leaves, twigs and branches, and finally death of the entire tree.

The fungus, however, remains alive and produces enormous numbers of spores. These spores are formed in the wood, bark, and in the tunnels and chambers made by the elm bark beetles. As the beetles emerge from these pupal chambers in May or June, they carry the spores on their bodies. A second brood of the lesser European beetle matures in late July and early August. These adult beetles will then travel as much as 700 feet to feed on healthy elms. Spores are thus transmitted to the fresh wood as the beetles chew through the bark. The lesser European

elm bark beetle generally chews in the crotches of small twigs. The native elm bark beetle, on the other hand, chews on the trunk and larger branches of the tree. Both species do a great deal of tunneling and chewing in healthy elms before seeking dying or cut elm wood for breeding. The beetles will travel as much as two miles to find a place for breeding.

The most effective control depends on suppression or elimination of the elm bark beetles. This can be done by eliminating all the dead or dying elm wood in which the beetles breed. This procedure is called "sanitation." An effective sanitation program must include the destruction, either by burning or burying under 12-18 inches of soil, of all dead or dying elm wood. This includes entire trees, parts of trees and fireplace wood in woodpiles, garages and other storage places. Dying or obviously weakened trees or parts of trees should be destroyed, even if the weakened branches are on healthy elms.

Healthy elms can also be sprayed with Methoxychlor to prevent the beetles from feeding. This procedure is only a form of additional protection and is not effective unless used as such. The spray should be applied in late winter or early spring, before the bark beetles become active to be effective.

Spreading of the fungus through root grafts can be prevented by applying various soil fumigant chemicals (such as Vapam) in a row of holes drilled in the soil between the infected tree and the healthy tree. These holes should be about 15 inches deep and 6 inches apart. The chemical kills all roots on both sides of the row of holes. ♦

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